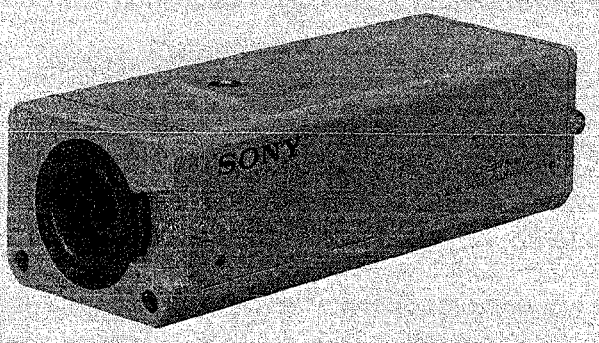
DXC-151/151P

CCD Color Video Camera



SONY®

SERVICE MANUAL

This service manual is for both the DXC-151 and the DXC-151P color video cameras.
The operating instructions for both cameras are the same, but their signal systems and the camera adaptors to be connected are different.

	Signal system	Camera adaptor
DXC-151	EIA standards, NTSC color system	CMA-D1
DXC-151P	CCIR standards, PAL color system	CMA-D1CE

For the customers in the U.S.A.

Warning—This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

Important—To insure that the complete system (including this peripheral) is capable of complying with the FCC requirements, it is recommended that the user make sure that the individual equipment of the complete system has a label with one of the following statements.
"This equipment has been tested with a Class A Computing Device and has been found to comply with Part 15 of FCC Rules."
—or—
"This equipment complies with the requirements in Part 15 of FCC Rules for a Class A Computing Device."
—or equivalent.

The shielded interface cable recommended in this manual must be used with this equipment in order to comply with the limits for a computing device pursuant to Subpart J of Part 15 of FCC Rules.

For the customers in Canada

This apparatus complies with the Class A limits for radio noise emissions set out in Radio Interference Regulations.

Pour les utilisateurs au Canada

Cet appareil est conforme aux normes Classe A pour bruits radioélectriques, spécifiés dans le Règlement sur le brouillage radioélectrique.

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SECTION 1
OPERATION

1-1. FEATURES

The DXC-151/151P is a color video camera which uses a CCD (Charge Coupled Device), a solid stage image sensor.

Mechanical Features

Compact and lightweight
The camera is so small and light that you can attach it anywhere: on a wall, ceiling, or tripod.

High resistance to vibration and jarring
You can obtain a fine picture with the least vibration noise even when the camera is moved.

Video Features

High quality picture
- High resolution: The CCD used in the camera has 768 × 493 (DXC-151) or 756 × 581 (DXC-151P) picture elements, ensuring a high resolution picture.
- Very faint after-images: A clear picture can be obtained even when shooting a rapidly moving object or shooting in low light.
- Minimum image distortion: Pictures can be shot in precise geometry.

RGB output connector (D-SUB 9-pin)
In addition to a composite video signal output, the camera has an RGB signal output, so you can connect it to an RGB monitor or an image processing device.

Y/C separated video output
By switching the setting of the internal switch, the camera outputs the luminance (Y) signal and the chrominance (C) signal separately. This allows you to connect the camera to a monitor equipped with the S-video connector and gives you a picture with the minimum flicker and color blur.

Features for Functions

Four modes for white balance adjustment
You can choose the mode of white balance appropriate for the lighting condition.

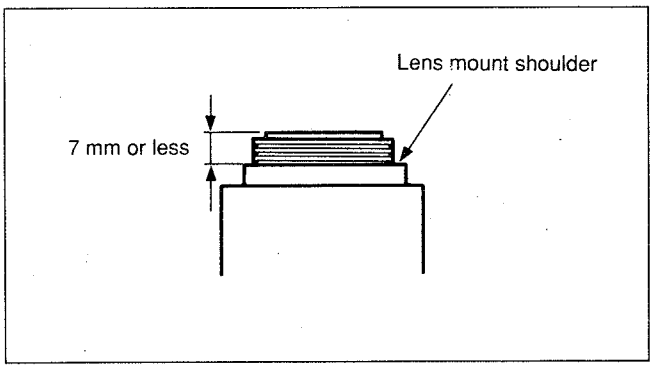
Electronic shutter with wide range of operating speeds
This camera's electronic shutter has nine speed settings from 1/60 (for the DXC-151) or 1/50 (for the DXC-151P) to 1/10000 second.

Four modes for the video output level (gain)
You can choose the video output level appropriate for the lighting condition from among four modes: AGC (Auto-Gain Control), 0 dB, 6 dB and 12 dB.

External sync system
When you use a video switcher to control two or more cameras, you can input the same sync signal to all of them so that they output pictures having the same quality.

1-2. LENS

You can mount any 2/3-inch C-mount lens as long as it does not project more than 7 mm from the lens mount shoulder.



1-3. CAMERA ADAPTOR

The camera adaptor you can use with this camera is the Sony CMA-D1 for the DXC-151 and the CMA-D1CE for the DXC-151P.

Note

The CMA-D1/D1CE camera adaptor is equipped with two DC OUT connectors to which two units can be connected. However, two DXC-151/151P cameras cannot be connected to this camera adaptor because of the specification of the power consumption. Be sure to use a camera adaptor for each camera.

1-4. CARE OF THE UNIT

Safety
- This camera is designed for operation on a power supply meeting the requirements indicated in the "Specifications".
- Should any material, liquid or solid, get into the body, unplug the AC power cord of the camera adaptor, and have the camera checked by qualified personnel before operating it further.

Operation
- Avoid rough handling or mechanical shocks.
- Operate the camera at a temperature ranging from 0°C to 40°C (32°F to 104°F).

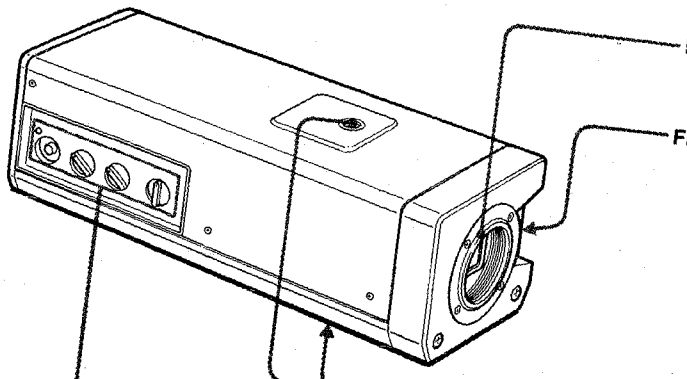
Installation
- Allow adequate air circulation to prevent internal heat build-up.
- Do not install the unit near a heat source such as a radiator or air duct or in a place subject to direct sunlight.

Cleaning
Clean the lens and filter with a blower.
Clean the body, panel and controls with a dry soft cloth, or soft cloth lightly moistened with a mild detergent solution. Do not use any organic solvents, such as alcohol or benzine, which might damage the finish.

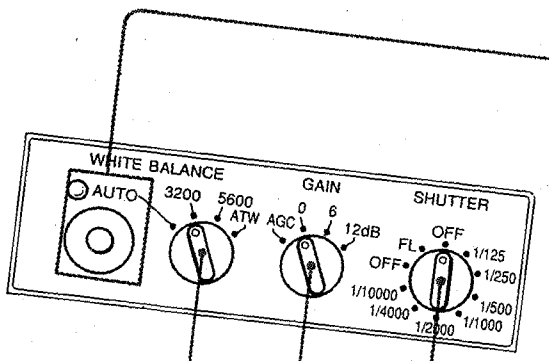
Repacking
Do not discard the carton. It affords maximum protection for shipping the camera. Repack the camera as it was originally packed at the factory.

1-5. LOCATION AND FUNCTION OF PARTS

Front and Side



Panel for white balance/shutter speed/gain controls



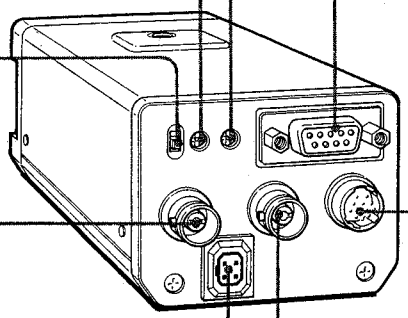
Connector Panel

H (horizontal) phase control
Use this control to adjust the H phase difference between the gen-lock input and video output signals.

SC (subcarrier) phase control
When using two or more cameras, use this control for fine adjustment of the subcarrier phase after making a rough adjustment with the subcarrier phase switch.

Subcarrier phase switch
Set this switch so that the subcarrier phase difference between the gen-lock input and video output signals is 0° or 180°.

GENLOCK IN (input) connector (BNC type)
This connector inputs the external sync signal (VBS or BS). Connect to the gen-lock input signal (VBS or BS) for synchronization when using two or more cameras in connection with a video switcher.



RGB SYNC connector (D-SUB 9-pin)
This connector outputs the RGB signals, composite video signal and sync signal. If you change the internal switch setting, the connector outputs the luminance (Y) signal and the chrominance (C) signal instead of the composite video signal.

DC IN (input) connector (12-pin)
Connect to the CMA-D1/D1CE camera adaptor.

VIDEO OUT (output) connector (BNC type)
This connector outputs the composite video signal.

LENS connector (4-pin)

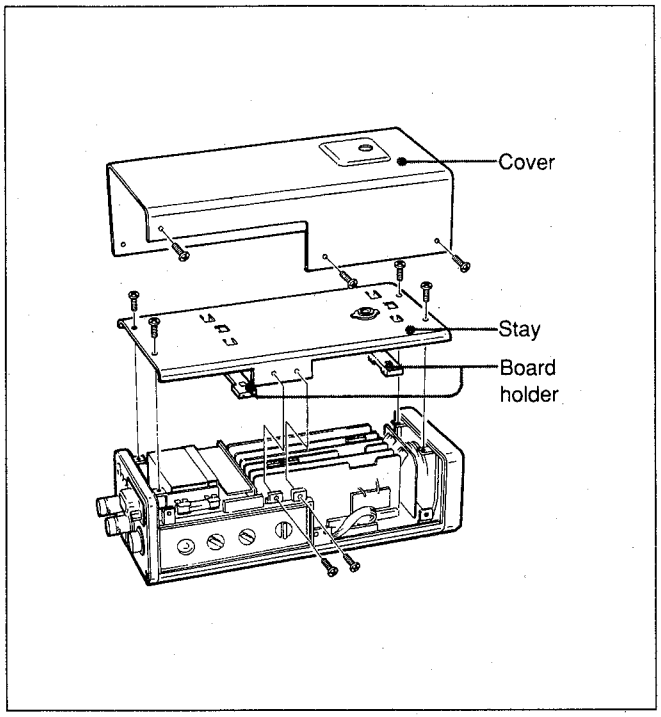
1-6. CHANGING THE SETTINGS OF THE INTERNAL SWITCHES

Six boards are installed in the camera. By changing the settings of the internal switches on two boards, you can do the following concerning the outputs of the RGB SYNC connector:

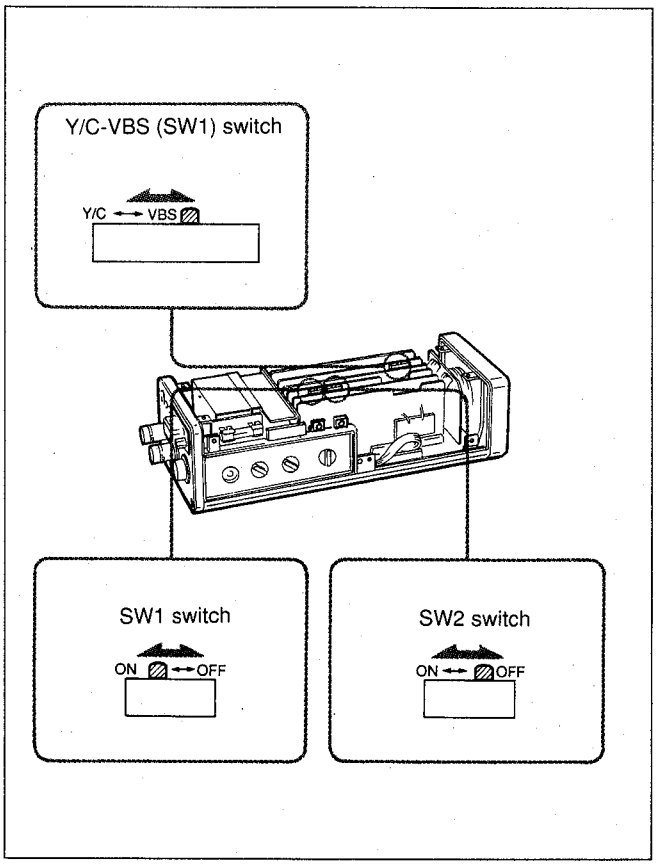
- Selecting one of the two output signals: Y/C separated signals or composite video signal
- Adding the sync signal to the G signal
- Selecting the sync signal level

Removing the cover

Unscrew five screws and remove the cover. Then unscrew the six screws securing the stay, and remove the stay and the board holder.



Setting the internal switches on the boards



Y/C-VBS (SW1) switch: for selecting the video output signal from the RGB SYNC connector

Y/C	The camera outputs the Y/C separated signal.
VBS	The camera outputs the composite video signal (factory setting).

SW1 switch: for changing the level of the sync signal

ON	The level is set to 2.0 Vp-p (factory setting).
OFF	The level is set to 0.3 Vp-p.

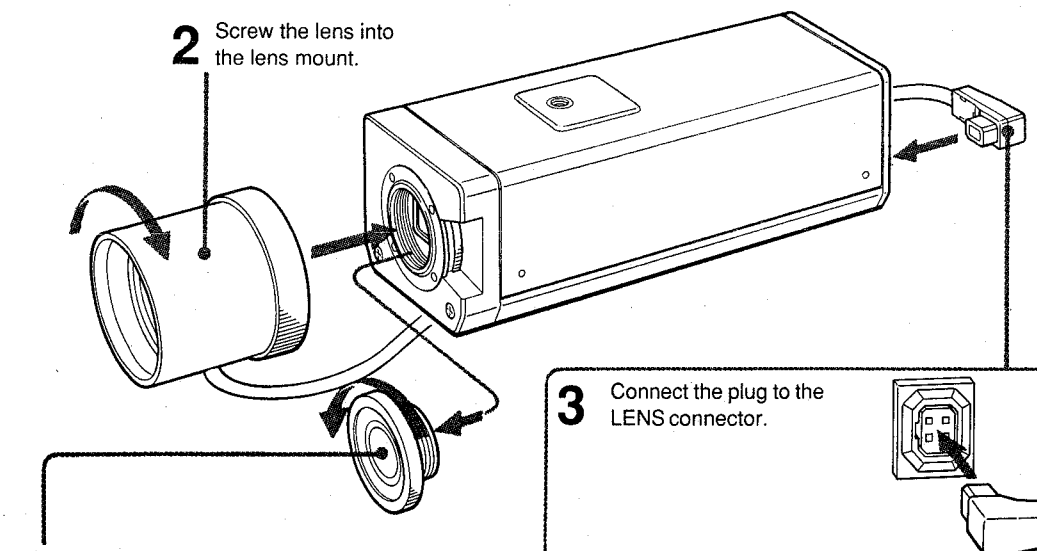
SW2 switch: for adding the sync signal to the G signal

ON	The sync signal is added to the G signal.
OFF	The sync signal is not added (factory setting).

1-7. INSTALLATION

Attaching the Lens

To use an auto iris lens, attach the lens as shown below.
When using a manual iris lens, omit step 3.



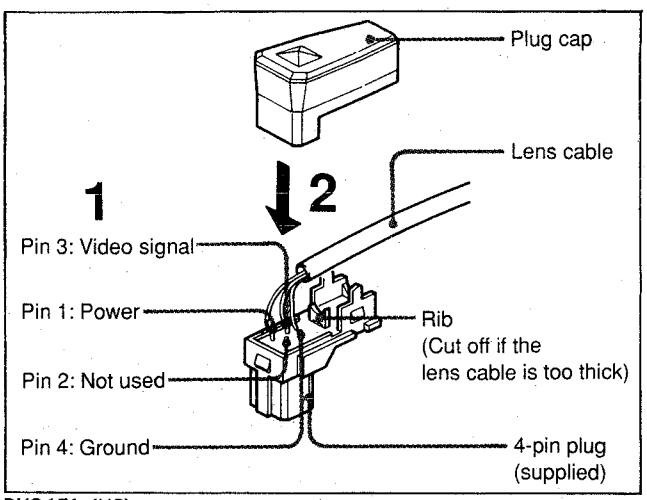
Make this connection after replacing the lens cable plug by the 4-pin plug supplied with this camera. About cable connection to the 4-pin plug.

Replacing the lens cable plug with the 4-pin plug supplied with the camera

To use an auto iris lens, replace its cable end plug by the 4-pin plug supplied with the camera, as shown below.

1 After disconnecting the lens cable from its plug, solder the cable wires to the pins on the supplied 4-pin plug as illustrated. (For identification of the cable wires, refer to the manual for your lens.) lens.)

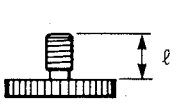
2 Place the cap on the plug.



Installing the Camera

- When installing the camera on a wall or ceiling, use an appropriate support or mounting bracket. Fix the camera to the support or bracket using screws as specified below, which match the screw holes in the camera body.
- When mounting the camera on a tripod, use the screw hole provided in the bottom of the camera.

U1/4"-20 UNC
ℓ: ISO standard 4.5 mm ± 0.2 mm
ASA standard 0.197 inches



1-8. CONNECTION

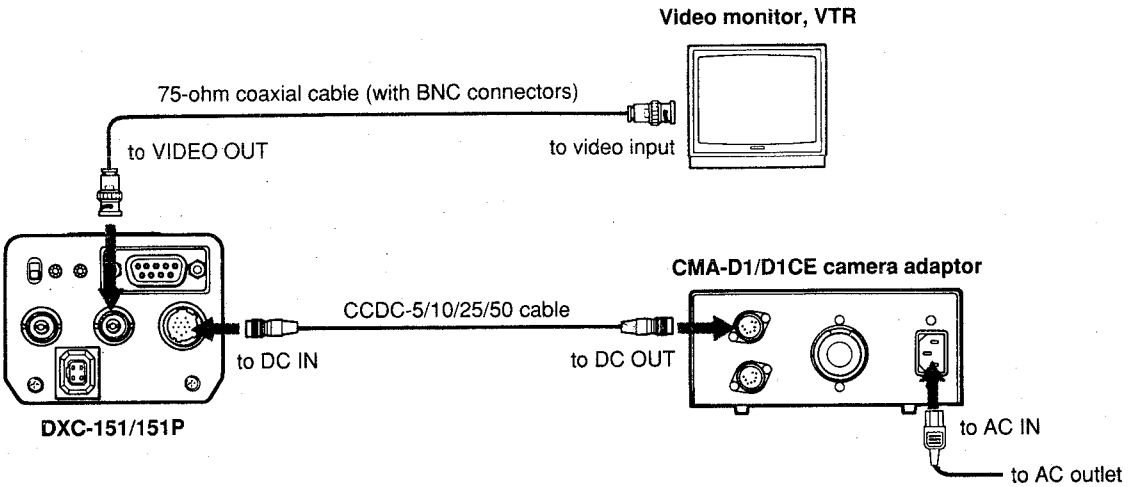
Supply power from the CMA-D1/D1CE camera adaptor to the camera.

Use either of the two video output connectors according to your application.

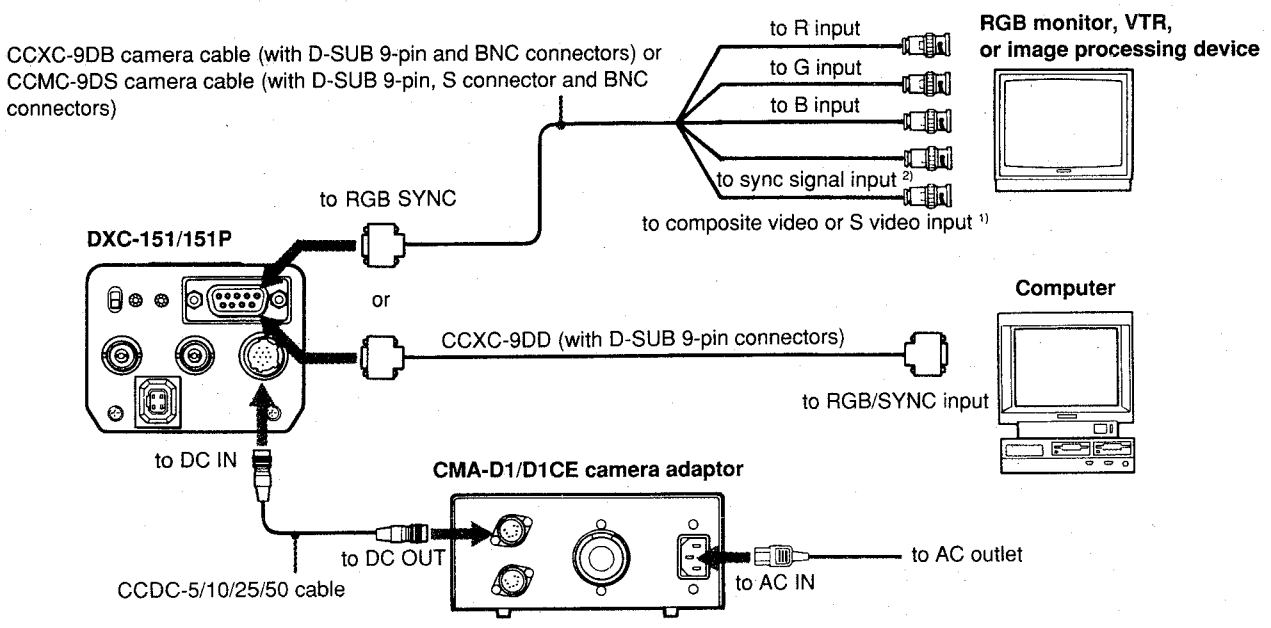
- VIDEO OUT connector
- RGB SYNC connector

When using one camera

Using the VIDEO OUT connector



Using the RGB SYNC connector



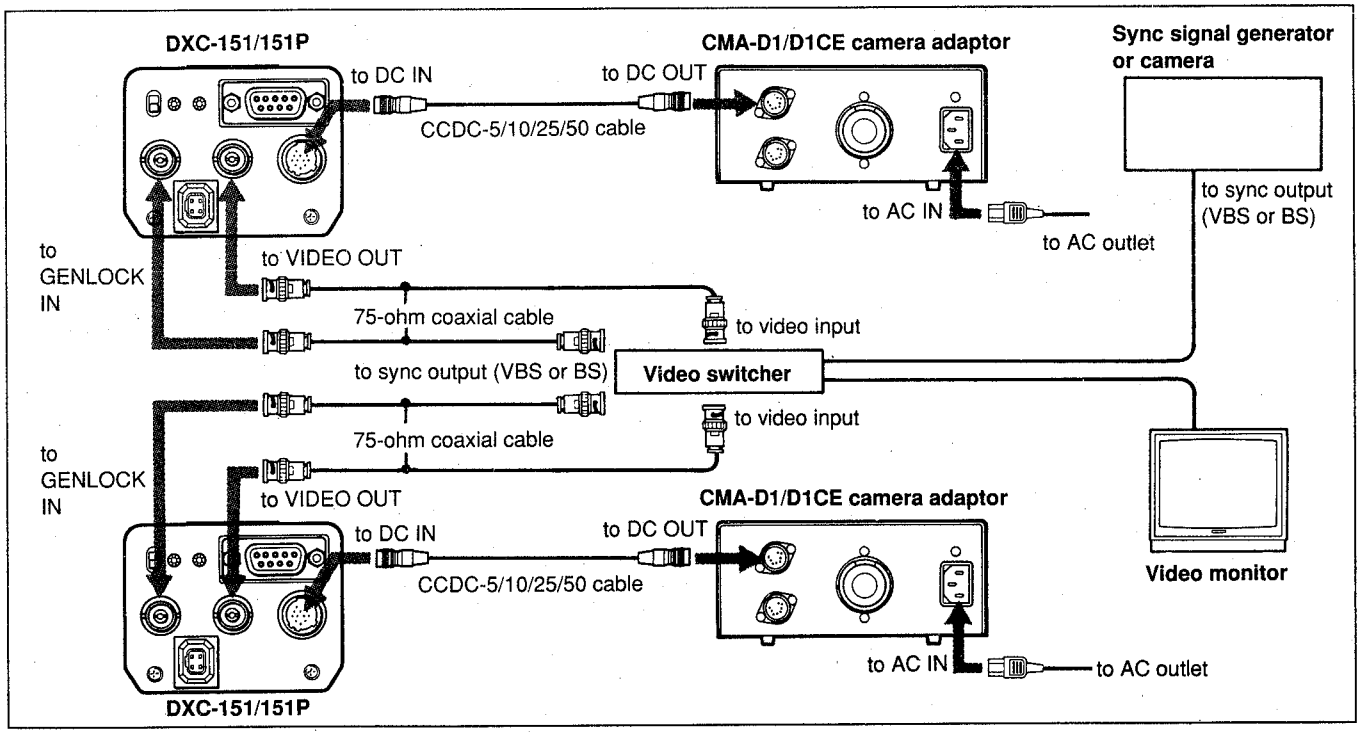
1) To select either the composite video signal or Y/C separated signals, change the setting of the Y/C - VBS select switch located on the internal board.

2) When using a monitor not equipped with a sync signal input connector, the camera can output the sync signal with the G signal. Change the setting of the SW2 switch located on the internal board.

When Using Two or More Cameras

When two or more cameras are connected to a video switcher, do the following two things on each camera to prevent the picture from being distorted and to obtain the same picture tone from each camera.

- Input a sync signal to the GENLOCK IN connector
- Adjust the subcarrier phase and the horizontal phase



Note

The CMA-D1/D1CE camera adaptor is equipped with two DC OUT connectors to which two units can be connected. However, two DXC-151/151P cameras cannot be connected to this camera adaptor because of the specification of the power consumption. Be sure to use a camera adaptor for each camera.

Use of the GENLOCK IN connector

When two or more cameras are to be used in connection with a video switcher, or a similar equipment, and each camera picture selected by the switcher is to be observed on the same video monitor, supply each camera with the same reference signal to obtain the same picture tone.
Connect a sync signal generator to the GENLOCK IN connector to supply a sync signal (VBS or BS) to each camera, so that all the cameras are synchronized to this signal.

Adjustment of the picture tone for two or more cameras

When two or more cameras are used in connection with a video switcher, or a similar equipment, supply each camera with a sync signal and adjust each camera to obtain the same picture tone. Adjust the subcarrier phase and the horizontal phase following the procedure described below.

Subcarrier phase adjustment
Adjust the subcarrier phase roughly by setting the subcarrier phase switch to 0 or 180 so that the phase difference between the gen-lock input and video output signals is 0° or 180°. Then, make the fine adjustment using the SC control. You need a screwdriver to turn the control. A vectorscope will allow you to make the adjustment more easily.

Horizontal phase adjustment
Adjust the horizontal phase with the H control. You need a screwdriver to turn the control. A waveform monitor or an oscilloscope will allow you to make the adjustment more easily.

Preparation

1 Check that all the units are connected properly.

2 Turn the POWER switch of the CMA-D1/D1CE to on.

3 Turn on the video monitor, and adjust its controls properly.

4 Set the GAIN switch of the camera to 0 (0 dB).
(Factory setting: 0 (dB))

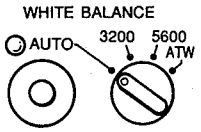
5 Illuminate the object properly.

6 When using a manual iris lens, adjust the iris depending on the lighting conditions.

When the preparation as described above has been completed, carry out the following adjustments and settings.

Adjusting the White Balance

Select the mode of white balance adjustment according to the lighting condition by setting the WHITE BALANCE switch to one of the following four positions.



Mode/Switch position	Color temperature
AUTO (automatic white balance)	When the AUTO button is pressed, the white balance is adjusted according to the color temperature of the subject automatically. The adjusted white balance is stored in the built-in memory until readjustment. This mode is suitable for shooting to be repeated under the same conditions.
3200	3200 K (fixed): Suitable for indoor shooting under the incandescent light.
5600	5600 K (fixed): Suitable for outdoor shooting on sunny days.
ATW (auto tracing white balance)	The white balance is adjusted according to the transition of the color temperature of the subject. This mode is suitable for shooting with variable lighting.

Note

When shooting a subject that moves fast in the ATW mode, the color of the picture may change due to the rapid change in color temperature. In such a case, change the mode of the white balance adjustment to another setting.

For better color setup according to the lighting conditions (automatic white balance adjustment)

1 Set the WHITE BALANCE switch to AUTO.

2 Shoot a white object (such as a white cloth or a white wall) so that it fills the screen.

3 Press the AUTO button. When the white balance has been adjusted, the lamp lights steadily for about two seconds.

The white balance is adjusted automatically so that the object looks white on the screen.

Memory of the automatic white balance adjustment value
The adjusted white balance is stored in the built-in memory and it is retained even if the camera is turned off. When the white balance is set to AUTO next time, the white balance is set to the value retained in the built-in memory automatically, so that you start shooting under the same lighting conditions immediately.

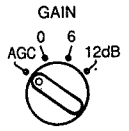
When the white balance is not adjusted automatically
When the white balance cannot be adjusted due to insufficient lighting, the lamp flashes.
When the lighting is too bright, the lamp lights even if the white balance cannot be adjusted properly. In this case, a white object does not appear in white to indicate that the white balance adjustment cannot be made properly. In both cases, try to adjust the white balance again as follows.

When an auto iris lens is used:
If the lighting is insufficient, increase the lighting and press the AUTO button again. Also, make the level adjustment or the ALC adjustment on the lens as required.

When a manual iris lens is used:
If the lighting is insufficient, open the iris or increase the lighting; if the lighting is excessive, stop down the lens. Then press the AUTO button again.

Adjusting the Video Output Level

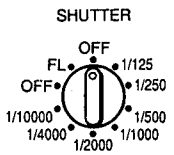
To adjust the video output level, set the GAIN switch in the appropriate position.



Gain/switch position	
AGC (automatic gain control)	The video output level is automatically adjusted according to the lighting condition. Set the switch in this position when the lighting conditions are subject to change, as in conditions outdoors.
0 (dB)	Generally, set the switch in this position.
6 (dB)	The video output level is raised by 6 dB or 12 dB depending on the position of the switch. When the lighting is insufficient and the picture observed on the monitor is too dim, set the switch in one of these positions.
12 dB	

Selecting the Shutter Speed

To select the desired shutter speed, set the SHUTTER switch in the corresponding position.



Switch position	Shutter speed (in seconds)
OFF	DXC-151: 1/60 DXC-151P: 1/50
1/125	1/125
1/250	1/250
1/500	1/500
1/1000	1/1000
1/2000	1/2000
1/4000	1/4000
1/10000	1/10000
FL*	DXC-151: 1/100 DXC-151P: 1/120

* FL (flickerless): Setting to prevent the picture from flickering on 50-Hz (DXC-151) or 60-Hz (DXC-151P) power supply.

Adjusting the Flange Focal Length

When using a zoom lens with this camera, it may be necessary to adjust the flange focal length (the distance between the lens mounting plane and the image plane). The properly adjusted flange focal length ensures that the subject is in focus whether the zoom is in the wide-angle position or telephoto position. Once the flange focal length has been adjusted, readjustment is not necessary as long as the same lens is mounted on the camera.

1 When a manual iris lens is used, open the iris fully.
When an auto iris lens is used, adjust lighting until the iris is fully open.

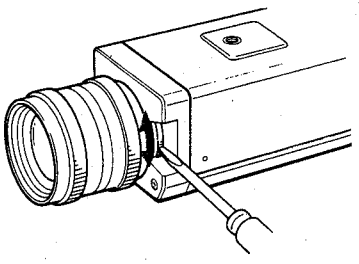
2 Point the camera at a subject about 3 meters (10 feet) away.

3 Set the zoom in the telephoto position.

4 Observing the monitor screen, turn the focus ring to focus on the subject.

5 Set the zoom in the wide-angle position.

6 Turn the flange focal length adjustment ring until the same subject is in focus. Do not turn the focus ring.

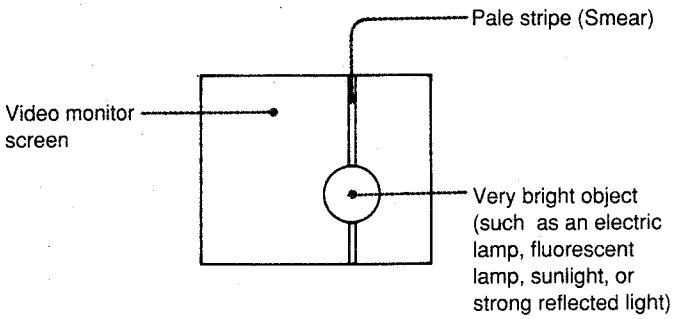


7 Repeat steps 3 to 6 until the subject is in focus both when the zoom is in the telephoto position and when it is in the wide-angle position.

1-10. SPECIAL CHARACTERISTICS OF A CCD CAMERA

The following conditions that may be observed during the use of a CCD video camera are not associated with any fault of the camera:

Smearing
The picture may be smeared when a very bright object is shot.



Patterned noise
This may appear over the entire monitor screen when the camera is operated at a high temperature.

Jagged picture
When fine stripes, straight lines, or the like are shot, the image monitored on the screen may appear jagged.

1-11. SPECIFICATIONS

Pickup device

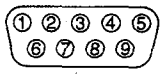
Pickup device	Interline-transfer CCD
Color filter	Primary color filter
Picture element	DXC-151: 768 × 493 (horizontal x vertical) DXC-151P: 756 × 581 (horizontal x vertical)
Sensing area	Equivalent to a 2/3-inch pickup tube

Optical and others

Lens mount	C mount
Signal system	DXC-151: EIA standards, NTSC color system DXC-151P: CCIR standards, PAL color system
Scanning system	DXC-151: 525 lines, 2:1 interface, 30 frame/sec. DXC-151P: 625 lines, 2:1 interface, 25 frame/sec.
Sync/system	Internal/external (switched automatically)
External sync signal	VBS or BS signal
Horizontal resolution	460 TV lines
Minimum illumination	25 lux with F1.4 (GAIN: 12 dB SHUTTER: OFF)
Sensitivity	2000 lux, F4 (GAIN: 0 dB)
Video output	RGB: 0.7 Vp-p, 75 ohms Composite video: 1 Vp-p, sync negative, 75 ohms Y: 1 Vp-p, 75 ohms C: C level is in accordance with VBS
Video signal to noise ratio	DXC-151: 48 dB or more DXC-151P: 46 dB or more
Electrical shutter	9 speeds selectable: OFF, 1/125 sec., 1/250 sec., 1/500 sec., 1/1000 sec., 1/2000., 1/4000., 1/10000 sec. and FL (flickerless)
White balance adjustment	4 modes selectable: AUTO, 3200, 5600 and ATW (auto tracing white balance)
Gain control	4 modes selectable: AGC, 0 dB, 6 dB and 12 dB

Input/output connectors

GENLOCK IN: BNC type
DC IN: 12-pin connector
VIDEO OUT: BNC type
RGB SYNC: D-SUB 9-pin connector

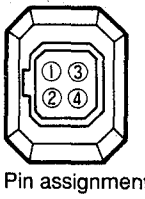


Pin assignment of the RGB SYNC connector

Pin No.	Signal
1	GND
2	
3	R output
4	G output [1]
5	B output
6	Y output or composite video output [2]
7	Sync output [3]
8	GND
9	NC or C output [2]

1) Change the setting of the internal switch to add the sync signal.
2) Change the setting of the internal switch to select the desired signal.
3) Change the setting of the internal switch to change the level of the sync signal.

LENS: 4-pin connector



Pin assignment of the LENS connector of the camera

Pin No.	Signal
1	+8.5 V, 40 mA
2	Not used
3	Video output for lens
4	GND

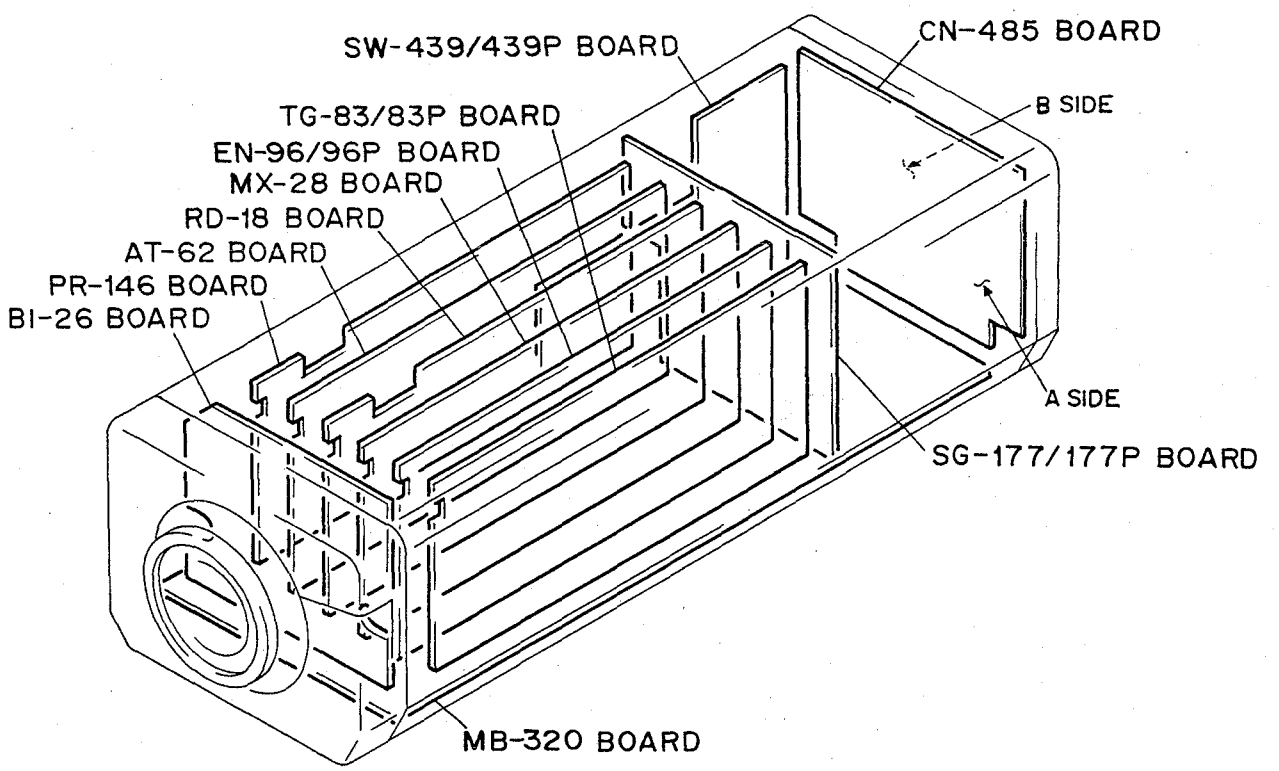
Power requirements
12 V DC
Power consumption
7 W
Operating temperature
0°C to 40°C (32°F to 104°F)
Storage temperature
–20°C to +60°C (–4°F to 140°F)
Operating humidity Less than 80% (no condensation allowed)
Storage humidity Less than 90% (no condensation allowed)
Shock resistance Less than 70 G
Dimensions 65 × 50 × 170 mm (w/h/d)
($2^5/_8 \times 2 \times 6^3/_4$ inches)
excluding projecting parts
Weight Approx. 520 g (1 lb 2 oz)
Accessories supplied
Lens mount cap (1)
4-pin plug matching the LENS connector (1)
CCDC-5 cable (5m) (1)
Operating instructions (1)

Accessories not supplied
CMA-D1 camera adaptor (for the DXC-151)
CMA-D1CE camera adaptor (for the DXC-151P)
CCDC-10/25/50 cable (10/25/50 m)
(with 12-pin connectors)
CCXC-9DD cable (with D-SUB 9-pin connectors)
CCXC-9DB cable (with D-SUB 9-pin and 5 BNC connectors)
CCMC-9DS cable (with D-SUB 9-pin, 4 BNC and S connectors)

Design and specifications are subject to change without notice.

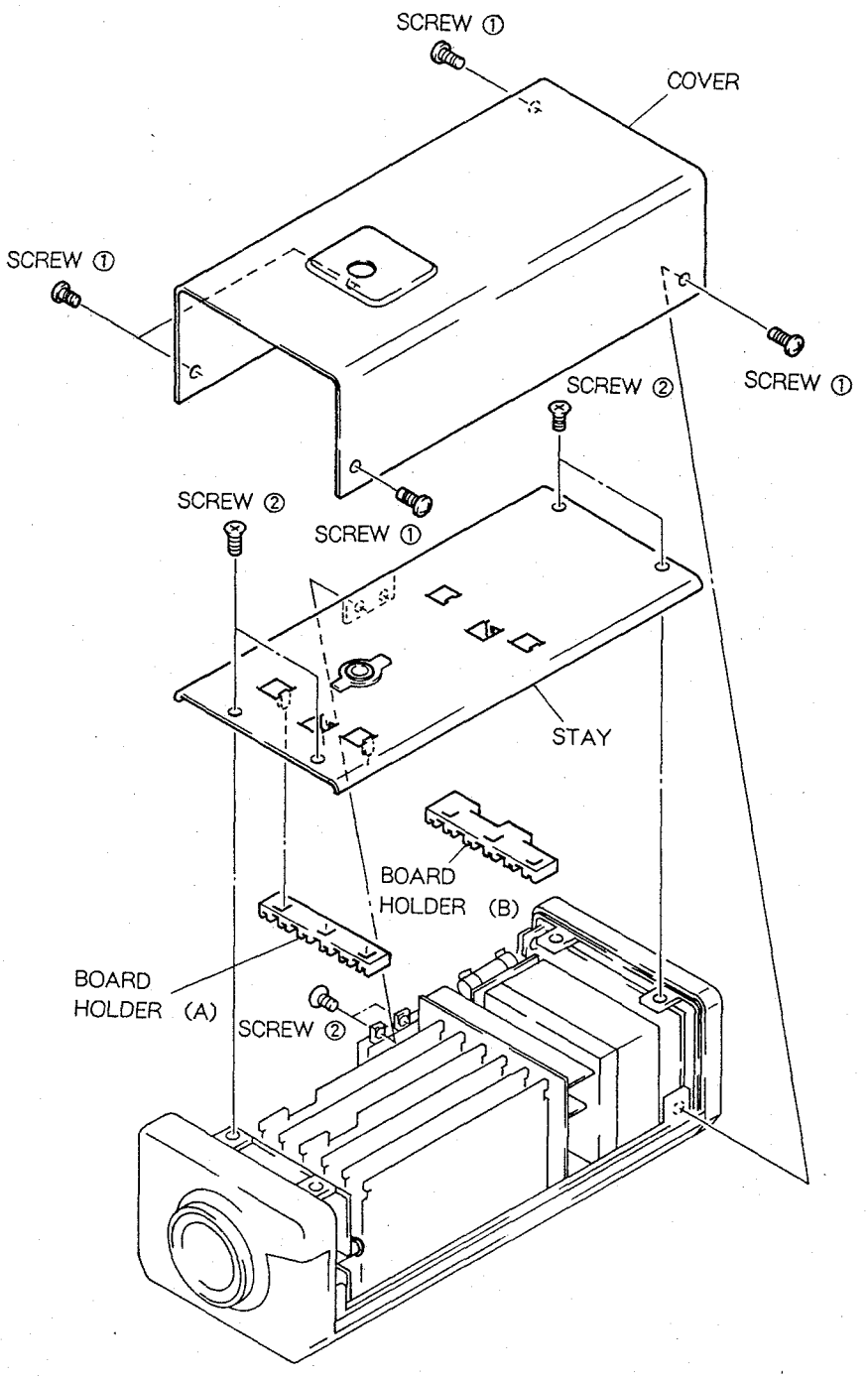
SECTION 2
SERVICE INFORMATION

2-1. BOARD LAYOUT



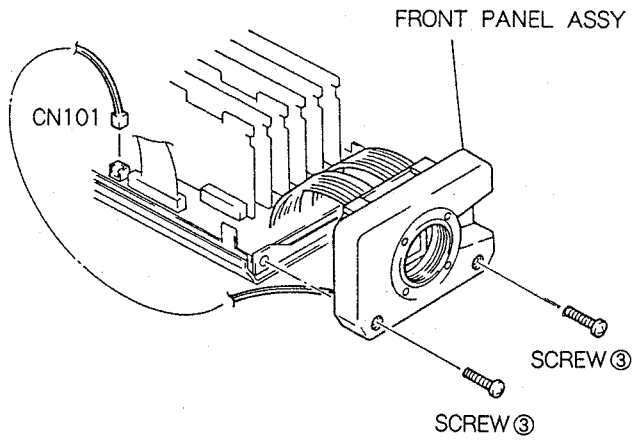
2-2. CABINET REMOVAL

1. Remove the five screws ① (+P2×6) and remove the COVER.
2. Remove the six screws ② (+K2×4) and remove the BOARD HOLDERS (A) and (B).

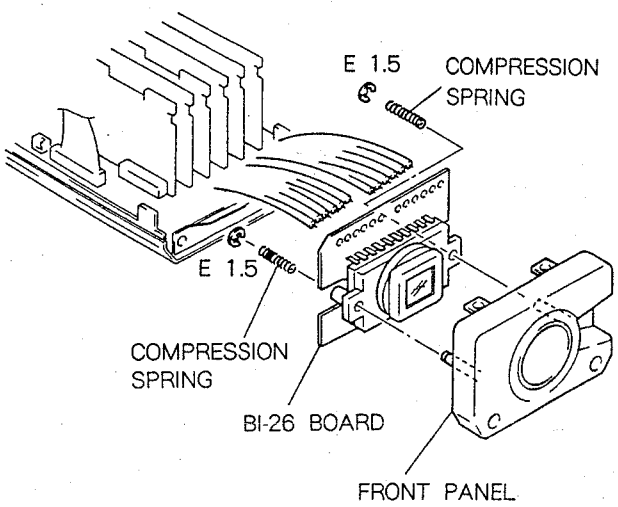


2-3. CCD IMAGER REMOVAL

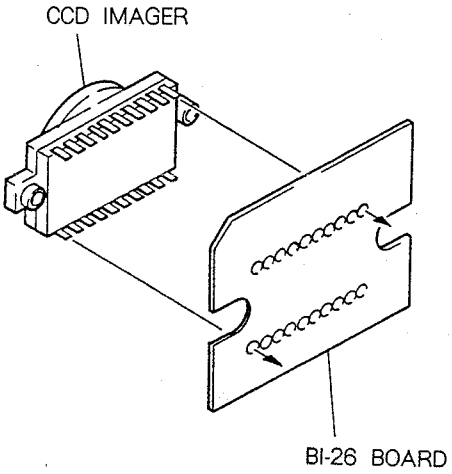
1. Remove the cabinet by referring to section 2-2 "Cabinet Removal".
2. Disconnect the connector CN101.
3. Remove the two screws ③ (+B2.6×4) and remove the FRONT PANEL ASSY.



4. Remove the two E-rings and remove the two COMPRESSION SPRINGs and the FRONT PANEL.
5. Remove the BI-26 board from the harness using a soldering iron.



6. Unsolder and remove the CCD imager from the BI-26 board using a soldering iron.



2-4. NOTE ON MAINTENANCE SERVICE

2-4-1. Notes On Replacement Parts

(1) Safety Related Components Warning
Components identified by shading marked and ⚠ marked on the schematic diagrams, exploded views and electrical spare parts list are critical to safe operation. Replace these components with Sony Parts whose part numbers appear as shown in this manual or in Service bulletins and service manual supplement published by Sony.

(2) Standardization of Parts
Repair parts supplied from Sony Parts Center may not be always identical with the part which actually in use due to "accommodation the improved parts and/or engineering changes" or "standardization of genuine parts". This manual's exploded views and electrical spare parts list are indicating the parts number of " the standardization genuine parts at present".

(3) Stocked Parts
The parts marked with "s" in the SP column of the exploded views and electrical spare parts list are normally required for routine service work. Order for parts marked with "o" will be processed, but allow for additional delivery time.

(4) Units of Capacitors, Inductors, and Resistors
The following units are omitted in the schematic diagrams, exploded views, and electrical parts lists unless otherwise specified;
Capacitor: μF
Inductor : μH
Resistor : Ω

2-4-2. PROM IC

Each PROM IC on the PC board has a suffix to its original designation.
This suffix may change according to improvement of IC. Never use an IC having no suffix to its original designation, because it is not programmed.

2-5. MATCHING CONNECTORS AND CABLES

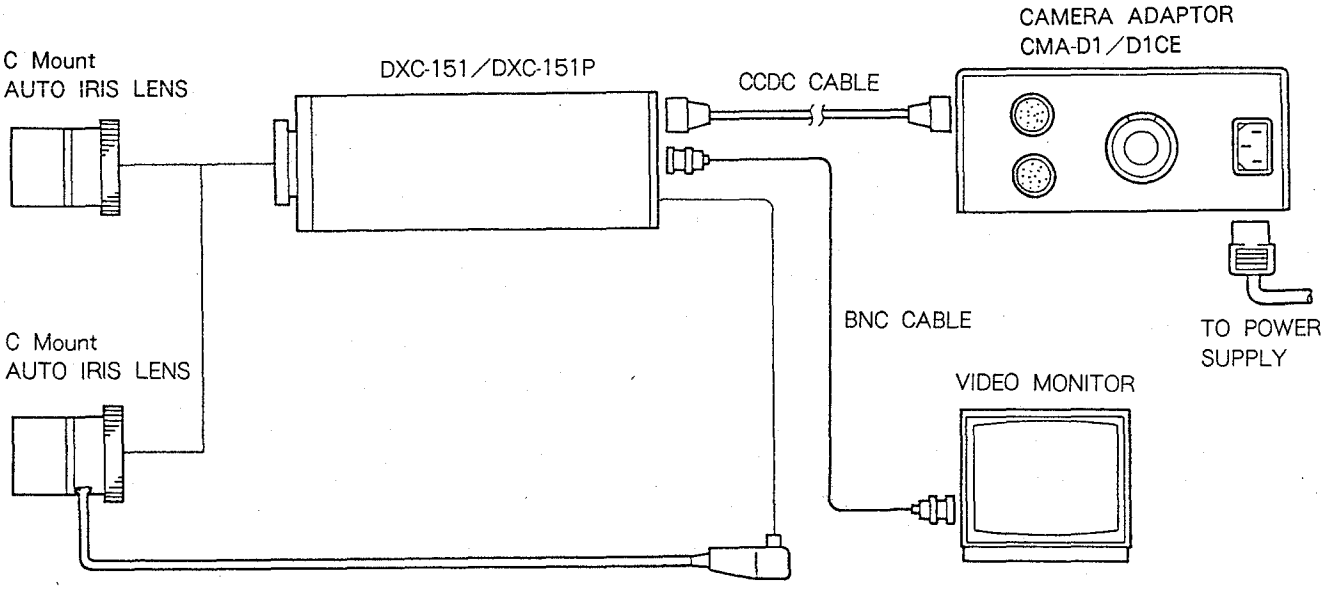
Connections made with the connector panels during installation or service, should be made with the connectors/complete cable assemblies specified in the following list, or equiralent parts.

Functional Name of DXC-151/DXC-151P	Part No. and name of connectors to be connected
DC IN 12P (Male)	ROUND CONNECTOR 12P (Female) CCDC-5/10/25/50 CABLES
LENS 4P (Female)	1-580-173-11 4P (Male)
VIDEO OUT BNC VIDEO OUT D-SUB 9P (Female)	D-SUB 9P (Female)

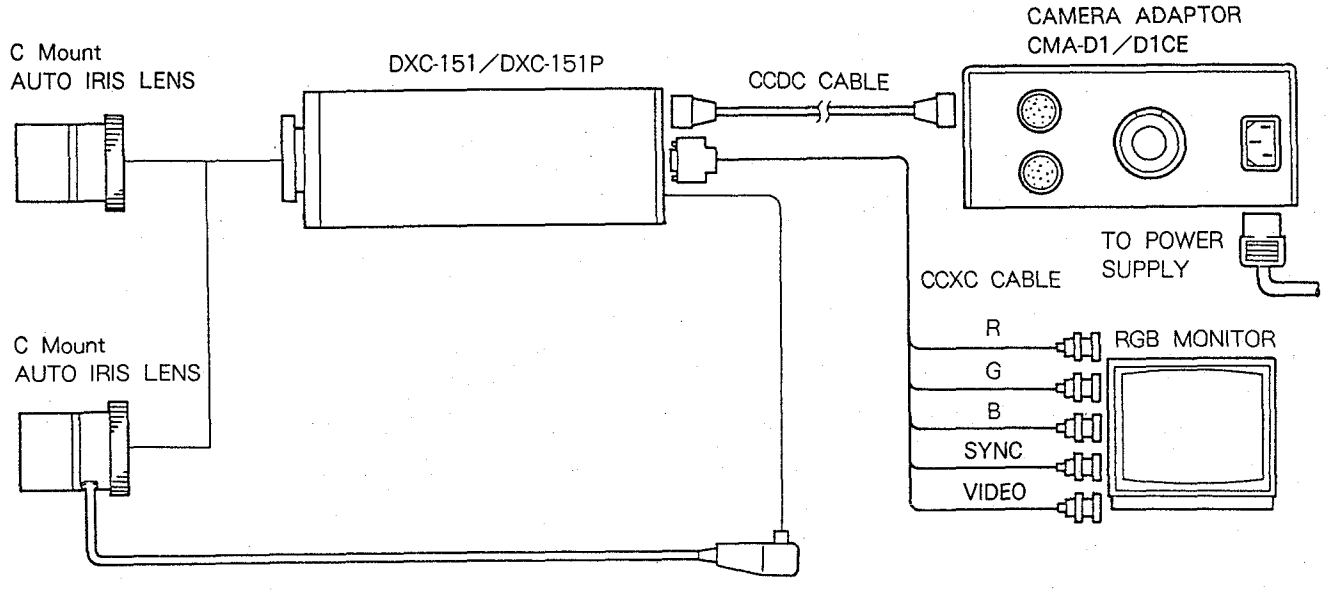
2-6. CONNECTION

2-6-1. System Connection

In case the VIDEO OUT connector is used:



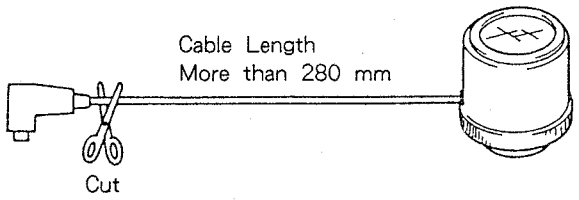
In case the RGB SYNC terminal connector is used:



2-6-2. Modification of Lens Connector

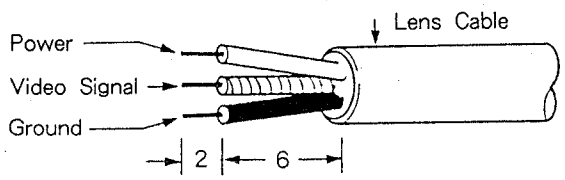
When connecting the auto iris lens, it is necessary to replace the lens connector with the supplied small type 4P connector.
Please make wiring according to the following procedures:

1. Cut the lens cable just beside the connector.



Note: Use the lens which operates on +8.5Vdc with a current of 40 mA or less.

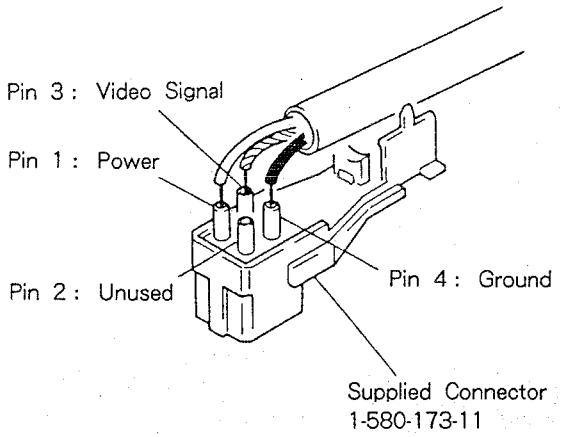
2. Strip the cover from each wire in specified length.



[Unit : in mm]

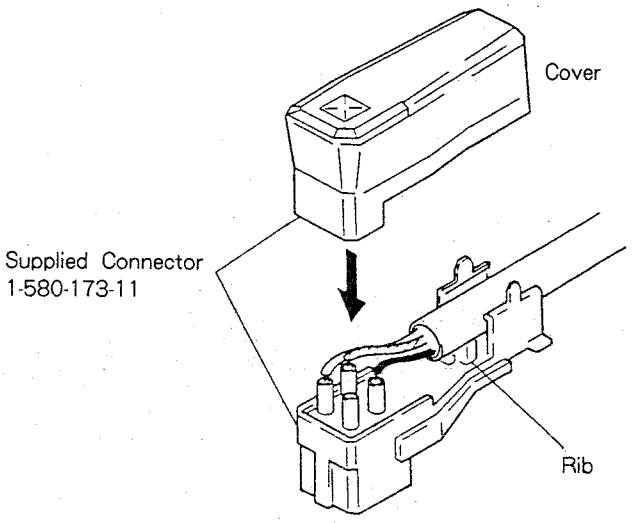
Note: Regarding the signal names of each wire in the lens cable, refer to the specification sheet of the lens.

3. Solder the three wires at the pins of the supplied 4-pin connector.



Note: In order to prevent transformation from excessive heating, soldering should be done quickly.

4. Install the connector cover with cable on the rib.



Note: When the cover can not be installed because the cable is too thick, cut off the rib.

2-7. INSERTION OF EXTENSION BOARD (EX-273)

To align the DXC-151/151P, two EX-273 boards are required.

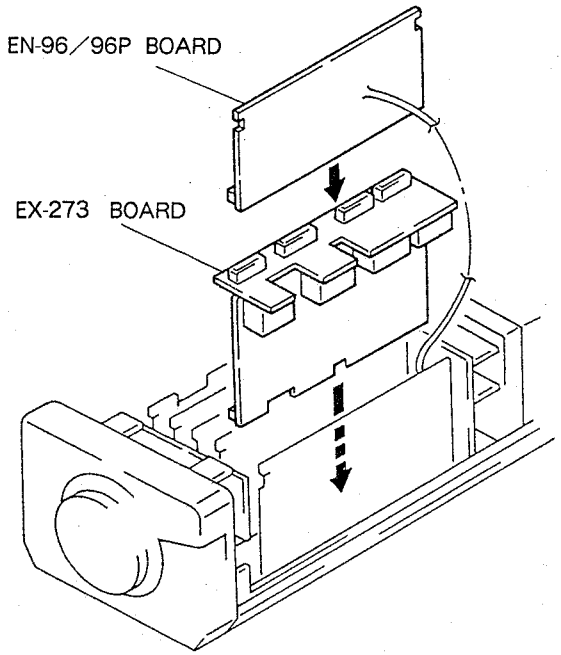
Note 1: Pull out or insert the board in proper manner to prevent connector from damage.

Note 2: Since the EN-96/96P board and SG-177/177P board have been connected with a short lead wire, be very careful to perform servicing.

2-7-1. Extension of EN-96/96P Board

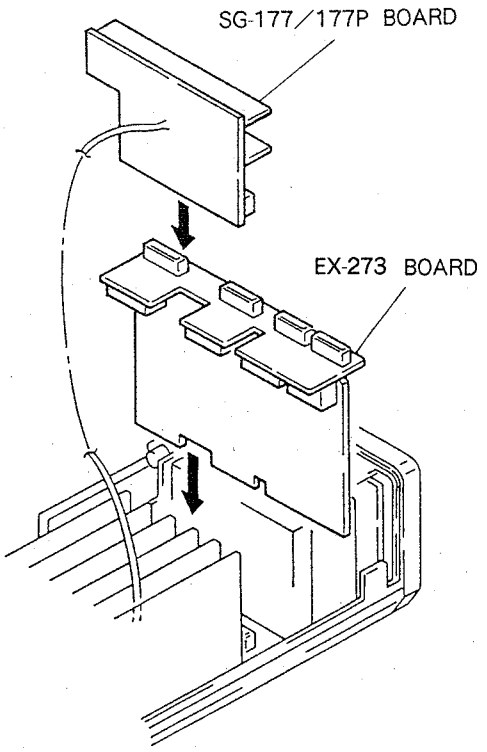
Extend the PR-146, AT-62, RD-18, MX-28, or TG-83/83P board in the same manner.

1. Remove the parts referring to section 2-2. "Cabinet Removal".
2. Pull out the EN-96/96P board carefully upward.
3. Insert the EX-273 board then EN-96/96P board straight into the connector as shown in Figure.



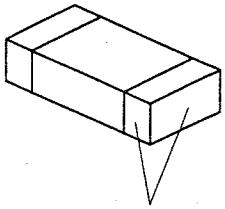
2-7-2. Extension of SG-177/177P Board

1. Remove the parts referring to section 2-2. "Cabinet Removal".
2. Pull out the SG-177/177P board carefully upward.
3. Insert the EX-273 board then SG-177/177P board straight into the connector as shown in Figure.



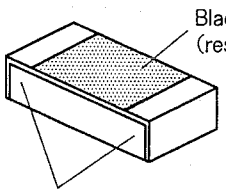
2-8. REPLACEMENT OF CHIP PARTS

Capacitor



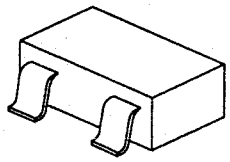
Covered with electrode.

Resistor



Not covered with electrode.

Diode and transistor



Tools required

- Soldering iron of approximately 20W (Use a temperature controller, if possible, which can control the iron temperature to 270 ± 10 ℃.)
- Desoldering metal braid (Part No. 7-641-300-81)
- solder (A solder of 0.6 mm in diameter is recommended.)
- Tweezers

Soldering conditions

- Iron temperature of 270 ± 10 ℃
- Soldering should be performed within two seconds.

Procedures

1. To remove a resistor or capacitor, place the tip of a soldering iron on chip parts to heat the parts, and then move it horizontally for removal while being desoldered. For removal of a diode or transistor, heat the one side, with two pins, of chip parts at the same time. Set the parts up when desoldered and remove two pins. And then remove the pin on another side.
2. Absorb solder by using a desoldering metal braid to smooth the land surface after removal.
3. Confirm by visual check that no trace is come off, no adjacent parts is damage and no bridging occur.
4. Perform a thin pretinning on the trace.
5. Place new chip parts on the trace to solder its both sides.

Note: Do not reuse parts which have been removed.

For details, see "CHIP COMPONENTS manual" (Part No. 9-963-089-01) prepared by Sony Corporation.

SECTION 3
THEORY OF OPERATION

3-1. OPERATION PRINCIPLE OF CCD

A CCD (Charge-Coupled Device) image sensor is a semiconductor device consisting of a MOS capacitors (unit cells) regularly arranged in two dimensional arrays. It has the following three functions for handling charges.

1. Photoelectric Conversion (Photosensor)
When incident light falls on the image sensor, the electric charge is generated by the MOS capacitors in proportion to the brightness received.

2. Accumulation of electric charge
When an external voltage is applied to the electrodes of a MOS capacitors, an electric potential well is generated in the silicon substrate of the MOS capacitors. The electric charge is accumulated in this well.

3. Transmission of electric charge
When a high or low voltage is successively applied to the electrodes of adjacent MOS capacitors, a deeper well or a shallower well is formed in proportion to the voltage. The electric charge can be transferred sequentially from one MOS capacitor to an adjacent MOS capacitor using this character.
When a high voltage is applied to a specific electrodes of a MOS capacitor, a deep electric potential well is generated, and a electric charge is transferred from neighboring well. When this is repeated among the regularly arranged electrodes, a electric charge is transferred from one MOS capacitor to another. This is the principle of CCD charge transmission.

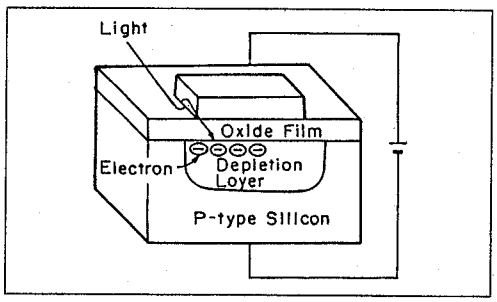


Fig. 1. MOS Capacitor

3-2. MECHANISM OF CCD CHARGE TRANSFER

DXC-151/151P employs the interline transfer system. In this system, the electric charges are transferred to neighboring potential well inproportion to the brightness of the image on the CCD sequentially as shown in Fig. 4 on page 3-2.
An image proportional to the brightness of the object is converted into an electric charge by the photosensor, and it is transferred to the neighboring vertical shift register. This electric charge is thus shifted vertically to the horizontal shift register section. Then it is output from the output section in horizontal sequence.

1. Vertical shift register operating principle
The vertical shift register operates on a "four-phase" drive system which reads the electric charge from the photosensor element. Fig. 2 shows an example of a change in the potential wells in each time period.
At t0, the electrode potentials from V1 through V4 are (V1=V2) > (V3=V4), the V1 and V2 potentials are deeper and the V3 and V4 potentials are shallower, so the charge is stored in V1 and V2 wells.
At t1, the electrode potentials are (V1=V2=V3) > (V4), so the charge is stored in V1, V2 and V3.
At t2, the electrode potentials are (V2=V3) > (V4=V1), so the charge is stored in V2 and V3.
Electrode potential states at t3 and after are shown below.

t3 (V2=V3=V4) > (V1)
t4 (V3=V4) > (V1=V2)
t5 (V4)=(V1=V2=V3)
t6 (V4=V1) > (V2=V3)
t7 (V4=V1=V2) > (V3)
t8 (V1=V2) > (V3=V4) (initial state: t0)

The vertical transfer is carried out by repeating the above operations.

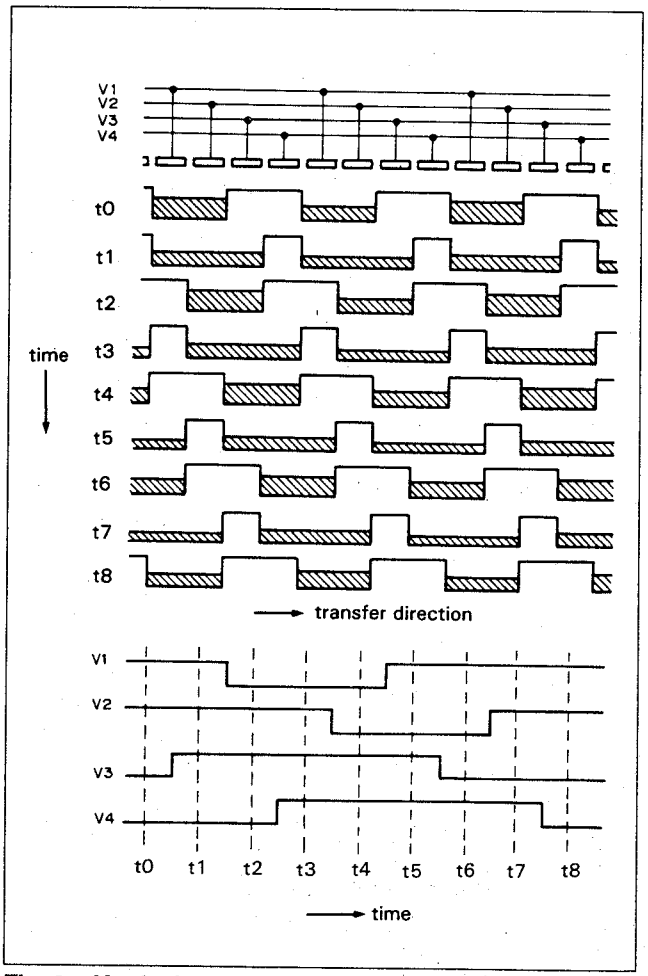


Fig. 2. Vertical Shift Register Operating Principle

2. Horizontal shift register operating principle

The horizontal shift register operates on a "two-phase" drive system which reads the electric charge from the photosensor element. Fig. 3 shows an example of a change in the potential wells in each time period.

At t1, the electrode potentials of H1 and H2 are H1>H2, the higher electrode potential of H1 well is deeper and H2 well is shallower so that the charge is stored in the deeper well H1.

At t2, the electrode potentials of H1 and H2 are inverted, the higher electrode potential of H2 well is deeper and H1 well is shallower so that the charge is stored in H2 well.

At t3, the electrode potentials of H1 and H2 have not changed, so the charge flows into the H2 well and one transfer of charge is completed.

The horizontal transfer is carried out by repeating the above operations.

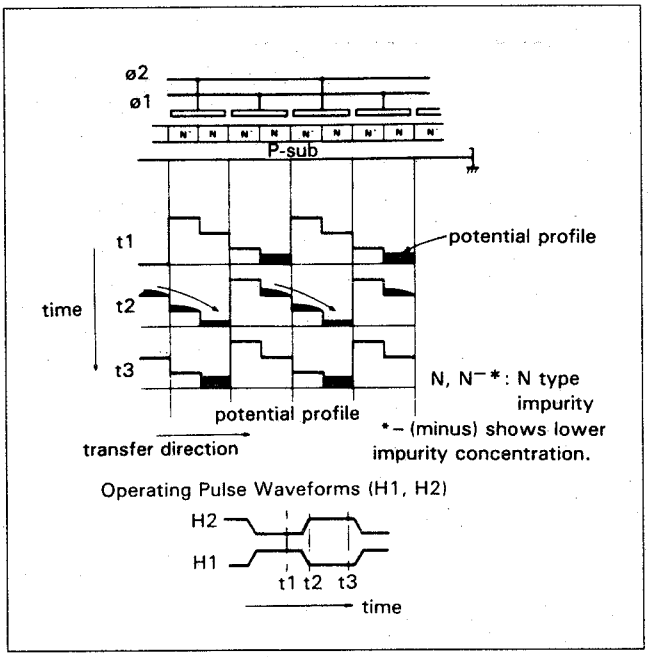


Fig. 3. Horizontal Shift Register Operating Principle

3-3. BI-26 BOARD

The incident light which comes through the camera lens falls on the surface of the CCD IC1 on the BI-26 board.

The surface of the CCD contains a number of photosensors. The CCD imager consists of 818 photosensors horizontally and 513 photosensors vertically. The total number of photosensors is 419,634 photosensors and the total number of effective photosensors is 378,624 (768 horizontally × 493 vertically).

The color filters of R (Red), G (Green) and B (Blue) are formed on the effective picture elements. G, R and B are formed in vertical stripe configuration. When the incident light passes the color filters, it is divided into the color components R, G and B. The divided colors are converted into electrical charge proportional to the brightness of each color. The converted signal charge is read out by a register section from the photosensor, and is transferred in sequence then fed to the output section.

There are horizontal shift register and vertical shift register in the shift register section. As shown in Fig. 4, there are 818 vertical rows of registers, while there is only one horizontal row of register, across the top. Each converted charge is transmitted every field (frequency of VD) to the vertical shift register adjoining to the photosensor. The signal charge is then vertically transferred in sequence at the vertical transfer clocks V1, V2, V3 and V4 to the horizontal register. The horizontal registers transfer charges horizontally at the horizontal transfer clocks H1 and H2 (=910 fH) to the output section.

The output from IC1 is output after the electrical charge has been converted to a voltage signal by the capacitor at the output section. It is then sent to the PR-146 board after passing buffer Q1.

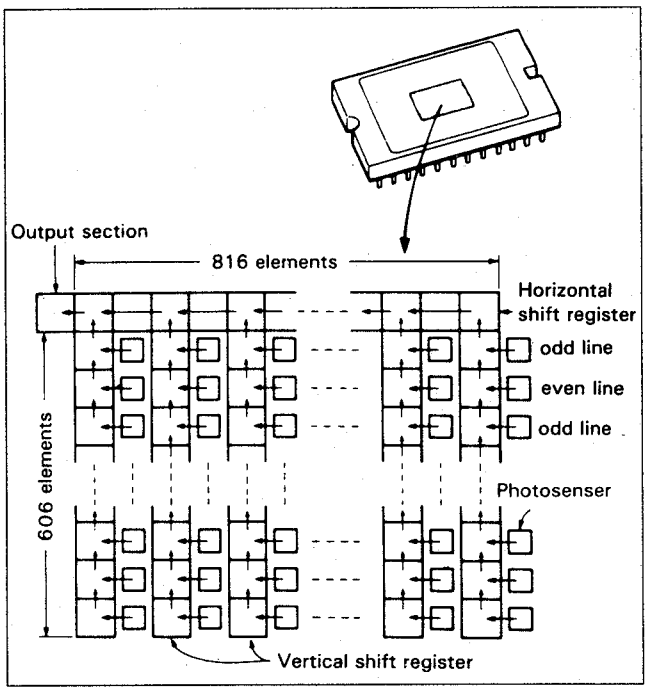


Fig. 4. CCD Interline Transfer System

3-4. PR-146 BOARD

The major functions of the PR-146 board are as follows:

① AGC
② Color separation of G signal and R/B signals from the CCD output signal
③ White balance
④ Gamma correction

The CCD output signal from the BI-26 board passes through the correlation double sampling type sample-and-hold circuit in IC4 so that the noise components peculiar to CCD is eliminated. This output is divided into two paths. One path is amplified by the amplifier inside IC4, and passed through the inverter Q10 and output as lens iris control signal from buffer Q9. The other path is passed through the AGC circuit in IC4 and is divided into two paths again. One path is input to the sample/hold circuit inside IC4 for separating the color components so that the signal is fed to the next stage by separating into the G signal and R/B signal. The other path is input to Q1 and is detected for AGC signal. Detected signal is passed through the operational amplifier in IC4 and is input to IC1 as one of the AGC signals. The AGC signal that inputs to IC1 is selected in accordance with the setting of AGC mode.
In order to compensate the leakage (cross-color peculiar to CCD) to G signal from R/B signal which has already generated by the previous circuit, separated G and R/B signals are input to the respective lowpass filters FL1 and FL2 having the band-width of luminance frequency, so the unwanted high frequency noise components are removed. These signals are input to cross-color cancel circuit (subtractor) consisting of Q11 and Q12 then the compensated signal is input to IC3.
The G and R/B signals that are input to IC3, are passed through the white balance circuit in IC3. The white balance circuit consists of three white balance amplifiers. The R/B signal that is input to IC3, is separated to R and B signals then input to the R signal white balance amplifier and B signal white balance amplifier respectively. They are controlled by the DC voltages (R CONT and B CONT signals) supplied from the AT-62 board then the white balance controlled R and B signals are mixed. The G and R/B signals passed through the white balance circuits, are fed to the MX-28 board via the gamma correction circuit IC2.

3-5. MX-28 BOARD

The major function of the MX-28 board is to obtain the vertical aperture compensation signal in order to improve the sharpness in the vertical direction, and to obtain the matrix signals, such as luminance signals (Y_H and Y_L-Y_H), color difference signals (R-Y and B-Y) and the RGB reproducing signals (R-Y_H, G-Y_H and B-Y_H) from the line sequential signals (every line for G signal and every other line for R/B signal) output from the CCD's color filter.
The G and R/B signals that are passed through the white balance circuit and the gamma correction circuit on the PR-146 board are processed by the clamp circuit and the sample/hold circuit inside IC5 and is then input to the matrix circuit of IC5 via the CCD type 1H delay lines IC1 and IC2.
Matrixed signals are defined by the following equations:

Definition:
G0, R0/B0: Signals directly input to IC5
G1, R1/B1: Signals passed through the first 1H delay line
G2, R2/B2: Signals passed through the second 1H delay line

$$Y_H = 0.5G1 + 0.25R1 + 0.25B0$$

$$Y_L = G1 + 0.3(R1 - G1) + 0.11 \times 1/2\{(B0 - G0) + (B2 - G2)\}$$
$$= 0.59G + 0.3R + 0.11B$$

$$R\text{-}Y = R1 - Y_L$$
$$= R1 - \{0.3R1 + 0.7G1 - 0.11 \times 1/2(G0+G2) + 0.11 \times 1/2 (B0+B2)\}$$
$$= 0.7R - 0.59G - 0.11B$$

$$B\text{-}Y = 1/2 (B0+B2) - Y_L$$
$$= 1/2 (B0+B2) - \{0.3R1 + 0.7G1 - 0.11 \times 1/2 (G0+G2) + 0.11 \times 1/2 (B0+B2)\}$$
$$= 0.89B - 0.59G - 0.30R$$

$$VAP = G0 - 0.5 (G1+G2)$$

Above signal processings are taken the characteristic of color filter against the CCD into consideration, so the same processings are performed when G0 and R0 signals are directly input to IC5.
Generated Y_H, Y_L-Y_H, R-Y, B-Y and VAP signals are sent to the EN-96/96P board and generated R-Y_H, G-Y_H and B-Y_H signals are sent to the RD-18 board.

3-6. EN-96/96P BOARD

The EN-96/96P board consists of the encoder circuit, sync generator circuit and a part of the subcarrier gen-lock circuit. The encoder circuit produces the VBS signal from the luminance signals (Y_H and Y_L-Y_H), color difference signals (R-Y and B-Y), vertical aperture compensation signal (VAP), etc.

The Y_H signal is bandwidth-limited by 7.2 MHz lowpass filters FL1 and FL2 then output to IC3 and to RD-18 board for outputting the RGB signals. The Y_L-Y_H signal is passed through the active-lowpass filter, delay time is compensated by delay line DL2 and input to IC3.

The Y_H signal input to IC3 is passed through the horizontal aperture compensation circuit then output as Y signal. In IC3, the Y signal is further amplified, excessive white component is clipped, setup level is added. The processed signalis input to the encoder circuit then output from IC3 at the same time.

The R-Y and B-Y signals are band-limited by active-lowpass filter and is input to IC3. In IC3, signals are clamped, and passed through the balanced modulator. And they are added to the burst signal and output as a chroma signal.

The chroma signal is once output from IC3, it is passed through the band-pass filter consisting of L5 and C81 and input IC3 again. At the same time, the chroma signal that is output from the band-pass filter, is sent to the MB-320 board via SW1. Further, the Y signal that is output from IC3, is also sent to the MB-320 board via SW1.

The Y and the chroma signals are mixed by IC3 and mixed signal is sent to the MB-320 board as VBS signal.

The sync generator IC2 generates the sync, blanking, FLD, HD, VD, FH and BF signals for the system from the clock signal (NTSC: 4fsc=14.31818MHz, PAL: 14.1875MHz) supplied from the TG-83/83P board in case of an internal sync mode, or from the VR, HR and L ALT R signals supplied from the SG-177/177P board in case of an external sync mode.

Since the EN-96/96P board contains sync signal generator and the VCO (IC6) which generates the 4fsc for the PAL system, a part of the subcarrier gen-lock circuit is also contained in the EN-96/96P board. Refer to section 3-11. SG-177/177P Board for more details.

3-7. RD-18 BOARD

The RD-18 board consists of the setup adjustment, white clip level adjustment, horizontal aperture compensation and vertical aperture compensation functions of each signal for outputting the RGB signals.

The vertical aperture compensation signal (VAP) is added to the R-Y_H, G-Y_H and B-Y_H signals respectively, they are sent to IC3, IC5 and IC4. The RGB signals are generated by adding the horizontal aperture compensation signal (YH) to each signal inside each IC.

The RGB signals are generated by the following equations:

Definition:

R_L, G_L, B_L:	Low frequency component of each color signal
Y_H':	High frequency component of YH signal
VAP:	Vertical aperture compensation signal

$R = R_L+Y_H'+VAP$
$G = G_L+Y_H'+VAP$
$B = B_L+Y_H'+VAP$

Generated RGB signals are passed through the setup circuit, white clip circuit level adjustment circuit inside each IC, then sent to the MB-320 board.

The SW1 and SW2 conselect either superimposing the sync signal on the G signal or output them independently.

3-8. TG-83/83P BOARD

The TG-83/83P board generates the following signals:

CCD Drive Signals

XH1, XH2: Horizontal clocks
XPG: Pre-charge gate clock
V1 to V4: Vertical clocks
SUB CONT: DC voltage for controlling the substrate potential

Electronic Shutter Clock Signals

SHP, SHD: Correlation double sample/hold pulses
SPI, SP2: Sample/hold pulses for separating the color signals
PRE BLKG: Blanking pulse for signal processing
CLP1, CLP2: Clamp pulses for signal processing

Color Filter Line Sequence Signals for synchronization

XDL1, XDL2: Matrix sample/hold pulses for synchronization, CCD type delay line input pulses

All the above signals are generated by the timing generator IC4. The timing generator works when the 28 MHz clock (NTSC: 28.63636 MHz, PAL: 28.375 MHz) and the VD and HD signals from the EN-96/96P board are input.
Generated signals are processed as follows:
All the CCD drive signals are output to the BI-26 board. The XH1, XH2 and XPG are directly output and V1 to V4 are output after reaching to a specified amplitude by the vertical clock driver IC2. The SUB CONT signal is designated by the electronic shutter mode select switch SW4 on the SW-439/439P board and is output after its voltage is adjusted by RV1. The SHP and SHD signal processing pulses for the electronic shutter clock are directly sent to the PR-146 board. The SP1 and SP2 signal processing pulses for the electronic shutter clock are also sent to the PR-146 as a pulses with defective correction function determined by IC4 and IC5.
The other signal processing pulses are output to each board according to the necessity.
A frequency of the 28 MHz VCO (IC1) is controlled by the VCO CONT signal. As to detail of the VCO CONT signal, refer to section 3-11. SG-177/177P board.

3-9. AT-62 BOARD

There is a white balance control function on the AT-62 board.
The G and R/B signals from the PR-146 board which have not been gamma-corrected are input to IC7. In IC7, the line sequential R/B signal is separated into R and B signals at an interval of 1H unit. Respective lower portion components on the screen are extracted from the R, G and B signals by the WINDOW pulse, they are rectified to DC voltage respectively. The G's DC voltage is regarded as the reference and is input to IC10. Further, the R's and B's DC voltages are regarded as the reference signal of the white balance and are input to IC10, too. The IC10 is an one-chip 8-bit microprocessor with EEPROM.
A white balance mode is selected by the WB SEL0 and WB SEL1 signals from the SW-439/439P board.
When AWB/ATW mode has been selected, the control signals proportional to the input of G and R/B signals are output from the serial ports. The R CONT and B CONT signals are converted into analog signals by the D/A converter IC5, and are sent to the PR-146 board in order to make a feedback loop.
In the AWB mode, D1 (LED) on the SW-439/439P is lit during activating the feedback loop. When the automatic white balance operation has been ended, D1 is turned off. If the automatic white balance can not achieve, D1 blinks to tell as an alarm.
An automatic white balance function does not work correctly if the unit is set at the dark place. The reason why it does not work is that the microprocessor is controlled by the DC voltage detected from the reference G signal. Namely, under the dark condition, the designation signal for the white balance mode is not input to the microprocessor from the SW-439/439P board, but the final step of the microprocessor is forcibly executed.
Presetting of the white balance mode is carried out by outputting the stored data from the EEPROM to the R CONT and B CONT signals for controlling the gain of the white balance amplifier on the PR-146 board.

3-10. SW-439/439P BOARD

The major functions of the camera can be selected by a user in accordance with the setting of each switch on the SW-439/439P board.

Switches on the board are as follows:
SW1: AWB mode select (Push switch)
SW2: White balance mode select (Rotary switch)
SW3: Gain mode select (Rotary switch)
SW4: Shutter mode select (Rotary switch)
D1: AWB mode indicator (LED)

3-11. SG-177/177P BOARD

The SG-177/177P board is a subcarrier gen-lock board.
Gen-lock is performed by locking the local (main) oscillator VCO on the camera with EXT VBS signal input from the CN-485 board. Namely, as frequency of the local oscillator is 8fsc in NTSC system, phase difference between the internal subcarrier that generates from the local oscillator and the burst of the EXT VBS signal is detected. The resultant error is input to the 8fsc VCO (8fsc=2× 910fH=28.63636 MHz) so that the phase locked loop is formed.
A phase of VD and HD signals are phase-locked by synchronizing the sync generator on the EN-96/96P board with the VR and HR signals separated from the EXT VBS signal forcibly.
The EXT VBS signal is input to IC1 and it is separated into two signals, VS signal and chroma signal. The VS signal is input to IC2, its sync components are separated and the VR and HR signals are generated. The VR signal is instantly output to the EN-96/96P board and the HR signal is passed through the monostable multivibrator IC5 then output to the EN-96/96P board. The phase of the monostable multivibrator IC5 can be adjusted by RV1 on the CN-485 board.
The chroma signal is once amplified by the amplifier in IC2 then it is detected by the phase detector.
Internal SC (subcarrier) signal is input to IC4 from the EN-96/96P board. IC4 has a function to change both positive and negative phase output and each phase as well, as against the SC input. The phase can be adjusted by RV2 on the CN-485 board. Either phase of subcarrier is selected by the switch in IC3 and the selected subcarrier is input to the phase detector in IC2. Virtual selection is performed by SW1 (SC 0/180°) on the CN-485 board.
Phase-detected output is again input to IC3 from IC2, it is passed through the sample/hold circuit and output to the EN-96/96P board the as the 4fsc CONT signal.
The 4fsc CONT signal that is input to the EN-96/96P board, is sent to the control terminal of the VCO IC1 on the TG-83/83P board via the analog switch IC1 on the EN-96/96P board.
In NTSC model, the VR and HR signals are not output during internal sync mode but the frequency-adjusted signal with RV1 that is connected to the analog switch on the EN-96/96P board, is input to the control terminal of the VCO on the TG-83/83P board.
In PAL model, there is a little difference as against the NTSC model. The two VCO system is employed in PAL model. One is a 4fsc VCO and the other is a system clock VCO (2×908fH=28.375 MHz). Signal flow of the subcarrier gen-lock circuit block is similar to the NTSC model, phase-detected error output (4fsc CONT signal) is input to the control terminal of VCO IC6 on the EN-96P board via the analog switcher. In internal sync mode, oscillating frequency of VCO can be adjusted by RV1 on the EN-96P board about the same as NTSC model.
But it is necessary to synchronize the system clock VCO (28 MHz) signal. In external sync mode, the H-interval's FH signal that is generated from the sync generator IC2 on the EN-96P board, and the H-interval's signal that is obtained from the sync separator circuit, are passed through the phase detector IC2 and the resultant error signal (EXT H COM) is sent to the EN-96P board. The EXT H COM signal is passed through the analog switch IC1 and the FET type buffer Q1, then it is output to the TG-83P board as the VCO CONT signal.
In the internal sync mode, the H-interval's FH signal and the H-interval's signal that is generated from the internal subcarrier, are passed through the phase detector IC2 and the resultant error signal is processed in similar manner of an external sync mode.
Namely, during external mode, the 4fsc VCO is synchronized with the external burst, and the system clock VCO is synchronized with the external H sync, V sync and L ALT signal.
During internal mode, the 4fsc VCO works as master and the system clock VCO works as slave, so the both VCO are synchronized at an interval of H (horizontal) frequency.

3-12. MB-320 BOARD

The MB-320 board is a mother board for all boards other than the BI-26 board, CN-485 board and the SW-439/439P board. The MB-320 board has a DC-DC converter. This DC-DC converter generates each power voltage from the externally supplied 12Vdc. Also, the MB-320 board output the VBS, Y, CHROMA, R, G and B signals to the CN-485 board from the 75Ω drivers consisting of IC1 through IC6.

3-13. CN-485 BOARD

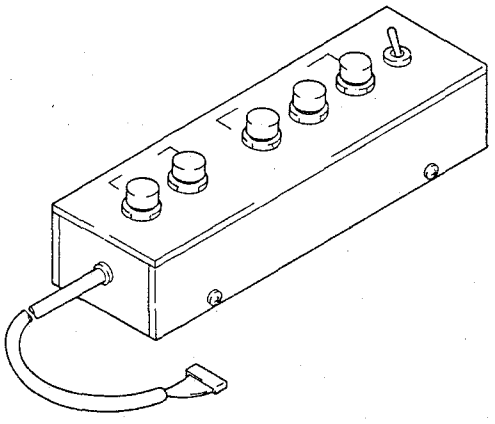
On the CN-485 board, all connectors on the rear panel are mounted. Signal interface to all external equipments are performed on this board.
R/G/B, SYNC, Y and CHROMA signals are output from the 9-Pin D-SUB connector CN105.
VBS signal is output from the BNC connector CN103.
In 12-Pin multi-connector (CN101), 12Vdc power and gen-lock signal are input, and the VBS signal is also output from this connector.
Also, an external gen-lock signal can be input from the BNC connector CN102.
+12V power for the lens with auto-iris function and the video signal for detection are output from the 4-Pin connector CN104.

SECTION 4
ALIGNMENT

4-1. PREPARATION

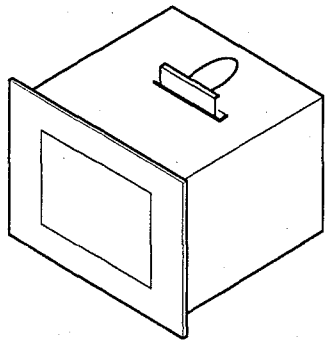
4-1-1. Fixtures and Equipments Required

J-6095-690-A	EVR (Electronic Control) Adjustment Fixture



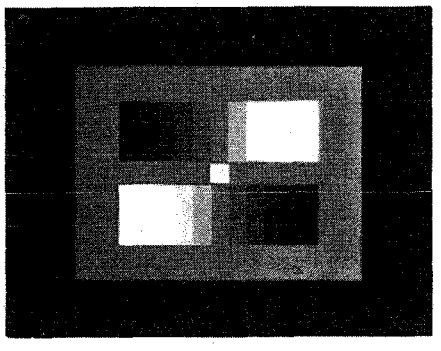
J-6029-140-B	Pattern Box PTB-500

• Light source for test chart



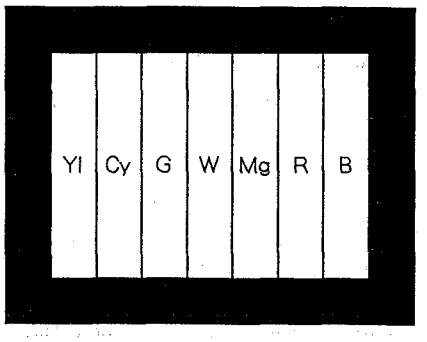
A-6026-130-B	Grayscale Chart

• For video level and gamma adjustment, etc.



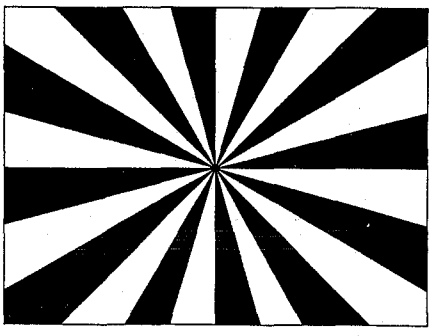
J-6020-250-A	Color Bar Chart

• For color adjustment



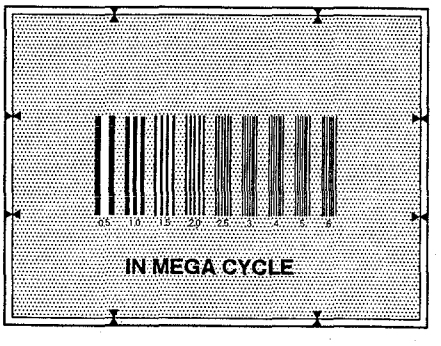
J-6024-340-B	Siemens Star Chart

• For back focus adjustment



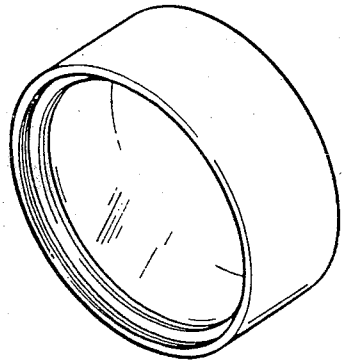
J-6021-910-A	In Mega Chart

• For aperture adjustment



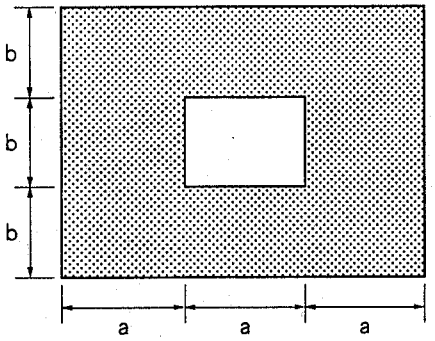
J-6080-058-A	LB-140 Filter

Color temperature conversion filter : C14



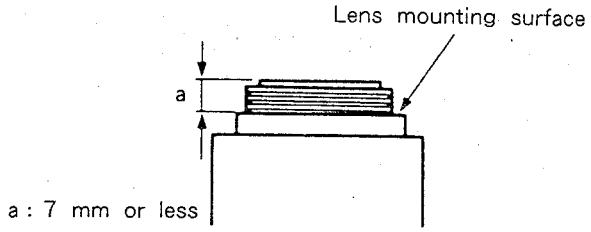
White Window Chart

Make a hole in the center of black paper.
(Size of hole should be about one third from both vertical and horizontal.)



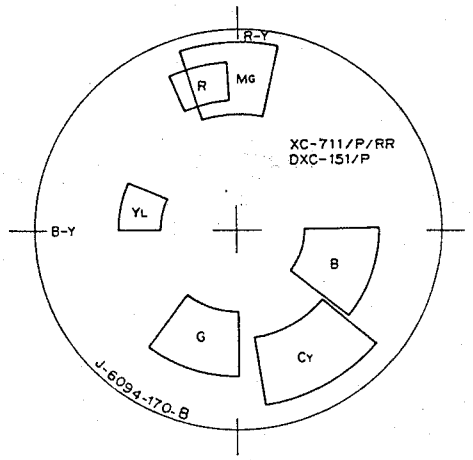
Commercial equipment and fixture

- Dual Trace Oscilloscope
- Vectorscope
- Waveform Monitor
- Frequency Counter
- Digital Voltmeter
- Color Monitor
- Lens (C mount and manual iris type)



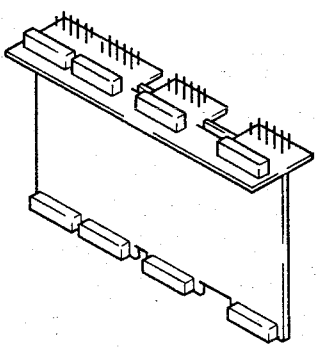
Note: Be sure to use a lens whose amount of "a" is less than 7 mm from the lens mounting surface.

J-6094-170-B	Vectorscope Scale



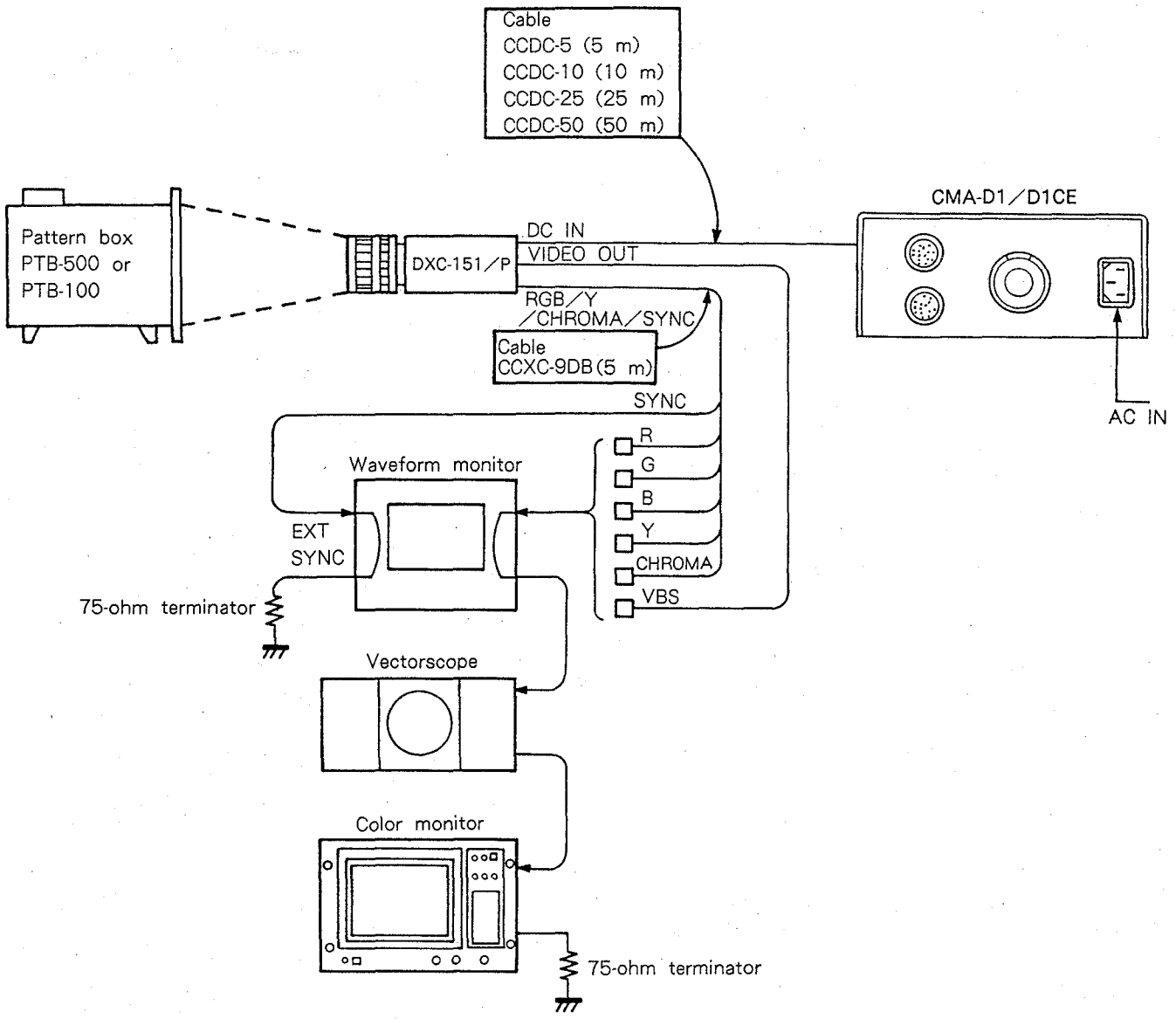
J-6095-730-A	Extension Board Fixture (EX-273)

Note : When adjusting, these two extension boards are required.



4-1-2. Connection

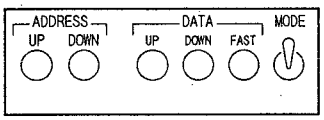
When performing the adjustment, make the following connection.



Note: When performing the adjustment, use the C mount type lens with manual iris function.

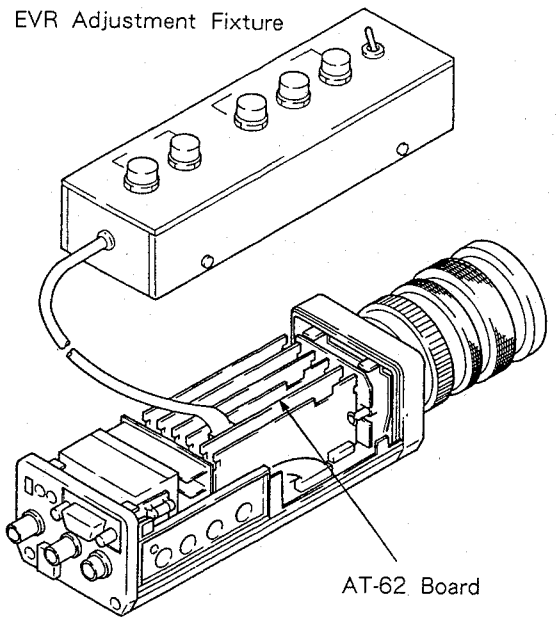
4-1-3. How to use an EVR Adjustment Fixture

Adjustment of an electronic controls (potentiometers) on the unit can be performed by the EVR adjustment fixture.



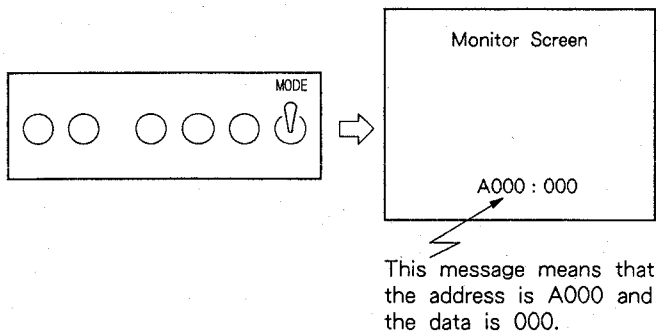
1. Preparation

Remove the camera cover. Connect the connector from the EVR adjustment fixture to CN1 on the AT-62 board, then connect the regulated DC power supply, junction box and the color monitor to the unit.



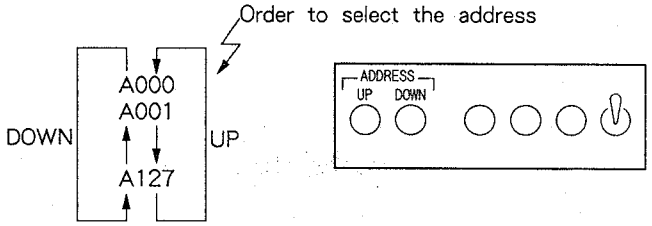
2. Mode Setting

Put the fixture into adjustment mode. The address and the data of an EVR adjustment fixture are displayed on the monitor screen.



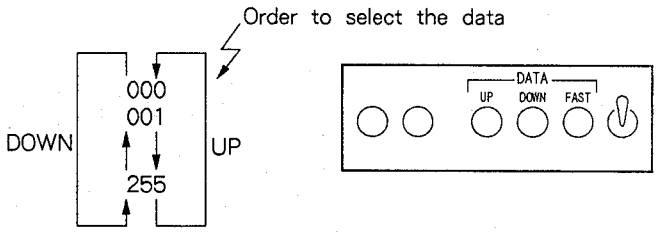
3. Address Selection

The address that is displayed on the monitor will go up (or down) by pressing the ADDRESS UP (or DOWN) button on the EVR adjustment fixture. When pressing the ADDRESS UP (or DOWN) button continuously, displayed address will change in succession.



4. Data Selection

The data (adjustment value) that is displayed on the monitor will go up (or down or fast) by pressing the DATA UP (or DOWN or FAST) button on the EVR adjustment fixture. By this operation, the adjustment value will change in the same manner that when an ordinary level control is turned.



<Coarse Adjustment>

When performing the coarse adjustment, press DATA UP or DATA DOWN button together with FAST BUTTON to change the data in 8-step unit.

5. Data Write into the Memory (End of adjustment)

A new data that has been set by the DATA button, will be written into the memory by shifting the address with ADDRESS UP or DOWN button. Thus, the adjustment is completed.

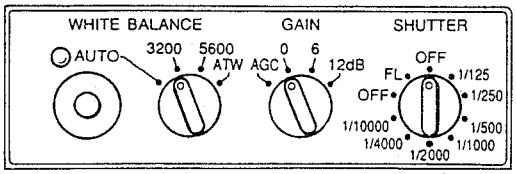
Note: If the adjustment mode is interrupted or the power is turned OFF without pressing the address button, a new data cannot be written into the memory but old data remains as it is.

4-1-4. Switch Setting Before Adjustment

(a) Switches

Switch setting of the camera

WHITE BALANCE switch : "3200"
GAIN switch : "0dB"
SHUTTER switch : "OFF"



EN-96(96P) Board
- SW1 (VBS/YC) switch : "VBS"

RD-18 Board
- SW1 (SYNC 0.3V/2V) switch : "ON"
- SW2 (G ON SYNC) switch : "OFF"

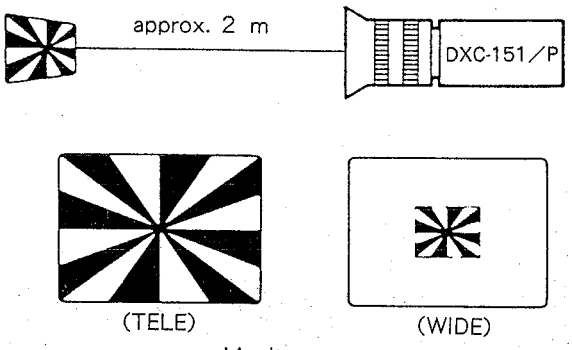
(b) Electronic control

1. GAIN switch (on the camera) → "12dB"
2. WHITE BALANCE switch (on the camera) → "3200"
3. **Test point:** TP1 (GND: E1)/AT-62 board
   Adj. point: A018/EVR adjustment fixture
   Spec.: +2.60 ± 0.05 Vdc
4. **Test point:** TP2 (GND: E1)/AT-62 board
   Adj. point: A019/EVR adjustment fixture
   Spec.: +2.75 ± 0.05 Vdc
5. GAIN switch (on the camera) → "0dB"

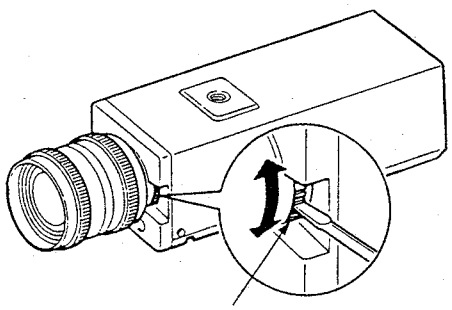
4-1-5. Mechanical Back Focal Length Adjustment

As the zoom lens has been attached, and if the best focus cannot be obtained both in telephoto and wide-angle positions, be sure to perform the back focal length (distance from the lens mounting surface to a plane where image is formed.) adjustment.
Readjustment will not be required until the lens is replaced.

Subject: Siemens star chart
Lens iris: Open



Adjustment Procedures
1. To appear the image on the monitor screen, open the lens iris, then shoot the siemens star chart approximately 2m away from the camera.
2. Set the zoom control to TELE-end position.
3. While observing the monitor screen, turn the zoom control for best focus.
4. Set the zoom control to WIDE-end position.
5. While observing the monitor screen, turn the back focus adjusting ring for best focus. At this time, do not turn the zoom control.



Back Focus Adjustment Ring

6. Repeat steps 2 to 5 until both TELE-end and WIDE-end are the best focus.

4-1-6. Precautions for Adjustment

Note

(1) Before adjustment, be sure to warm up the unit more than 10 minutes.
(2) Adjusting value which the tolerance does not specify, should be adjusted within ± 2% of the specified value. (However, the EVR data should be adjusted within the specified value.)
(3) Connect the cold terminal of the probe to a chassis, if it is no specific ground position.
(4) If the amplitude level of the measured waveform cannot discriminate on the oscilloscope screen, connect 10k-ohm resistor in series with the probe of the oscilloscope.
(5) If the amplitude level of the measured waveform cannot discriminate on the waveform monitor screen, set the RESPONSE switch on the waveform monitor to "LUM" mode.

4-1-7. Adjustment Items

4-2. REFERENCE SYSTEM ADJUSTMENT
4-2-1. CCD Substrate Voltage Adjustment
4-2-2. Subcarrier Frequency Adjustment

4-3. PROCESS SYSTEM ADJUSTMENT
4-3-1. White Clip Pre-adjustment
4-3-2. Color Mixture Compensation Adjustment
4-3-3. Gain Adjustment
4-3-4. Pedestal Adjustment
4-3-5. Gamma Pre-adjustment
4-3-6. White Balance Pre-adjustment
4-3-7. SYNC Level Adjustment
4-3-8. Burst Quadrature Adjustment (for PAL)
4-3-9. Burst Level Adjustment
4-3-10. Setup Level Adjustment
4-3-11. White Clip Pre-adjustment
4-3-12. White Clip Adjustment
4-3-13. Y Level Adjustment
4-3-14. Gamma Adjustment
4-3-15. Y Gain Adjustment
4-3-16. Chroma Gain Adjustment
4-3-17. Multiplex Adjustment
4-3-18. G1 Gain Adjustment
4-3-19. G2 Gain Adjustment
4-3-20. R1/B1 Gain Adjustment
4-3-21. R2/B2 Gain Adjustment
4-3-22. White Balance Adjustment
4-3-23. HUE Adjustment

4-4. RGB SYSTEM ADJUSTMENT
4-4-1. Setup Level Adjustment
4-4-2. RGB Level Adjustment
4-4-3. White Clip Level Adjustment
4-4-4. G ON SYNC Level Adjustment
4-4-5. RGB Aperture Adjustment

4-5. VBS SYSTEM ADJUSTMENT
4-5-1. VBS Aperture Adjustment
4-5-2. Chroma Suppress Adjustment
4-5-3. Color Mixture Compensation Fine Adjustment
4-5-4. AGC Adjustment
4-5-5. Low Light Level Adjustment

4-6. WHITE BALANCE SYSTEM ADJUSTMENT
4-6-1. 5600°K Adjustment
4-6-2. Auto Tracing White Balance Offset Adjustment
4-6-3. Auto White Balance Hysteresis Data Setting

4-2. REFERENCE SYSTEM ADJUSTMENT

4-2-1. CCD Substrate Voltage Adjustment

Equipment: Digital voltmeter
To be extended: TG-83 (83P) board
Test point: TP1 (GND: E1)/TG-83 (83P) board
Adj. point: ⊘ RV1/TG-83(83P) board
Spec.: Set value ± 0.1V

- **Set value**
  When replacing the CCD imager, refer to a code (two digits) in the reverse side of a new CCD imager.
  When the CCD imager is not replaced, refer to a printed code which labeled inside the upper portion of the front panel.
  When the CCD imager has been replaced, be sure to change a two digits code inside the upper portion of the front panel to a new code.
  Code (Two digits indication): □ □
  ↑ integer ↑ decimal

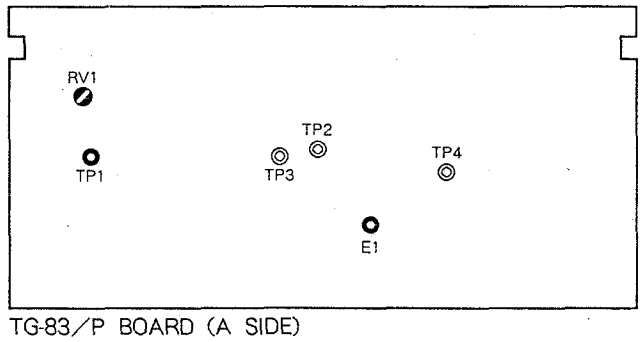
Relationship between a integer portion of the codes and the actual values is as follows:

Integer of codes	9	A	B	C	D	E	F	G	H	I	J
Actual values	9	10	11	12	13	14	15	16	17	18	19

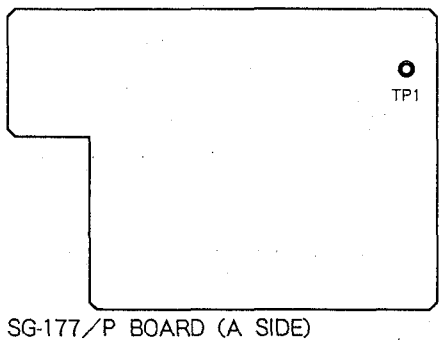
<Ex.> F5 → 15.5 (V)

4-2-2. Subcarrier Frequency Adjustment

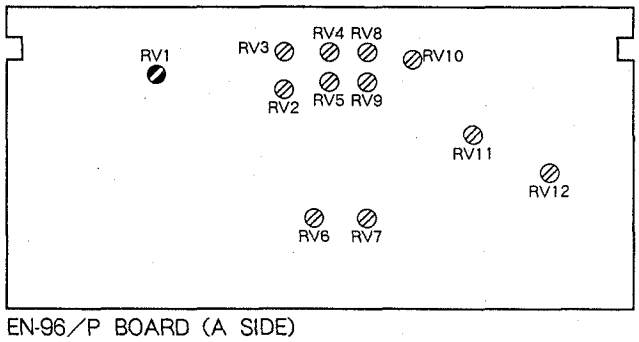
Equipment: Frequency counter
To be extended: EN-96 (96P) board
Test point: TP1/SG-177 (177P) board
(GND: E1/TG-83 (83P) board)
Adj. point: ⊘ RV1/EN-96 (96P) board
Spec.: 3,579,545 ± 10 Hz (for NTSC)
4,433,619 ± 10 Hz (for PAL)



TG-83/P BOARD (A SIDE)



SG-177/P BOARD (A SIDE)



EN-96/P BOARD (A SIDE)

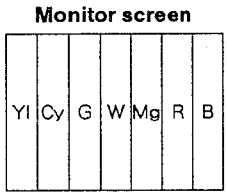
4-3. PROCESS SYSTEM ADJUSTMENT

4-3-1. White Clip Pre-adjustment

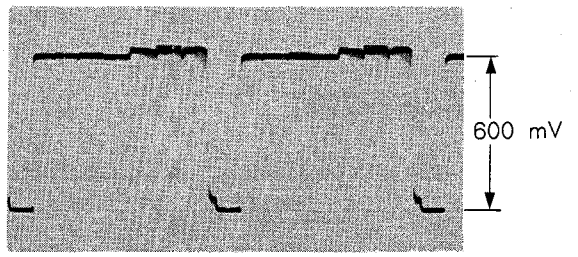
Subject: Color bar chart
Equipment: Oscilloscope
To be extended: PR-146 board
Trigger: HD (TP3/TG-83 (83P) board)
Adj. point: ⊘ RV7/PR-146 board

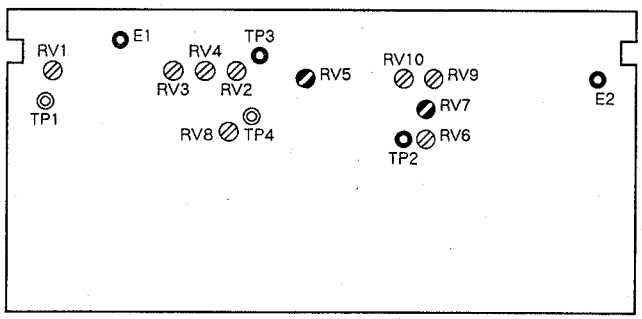
Adjustment Procedure

1. Adjust the zoom control of the lens so that the chart frame matches the underscanned monitor frame.

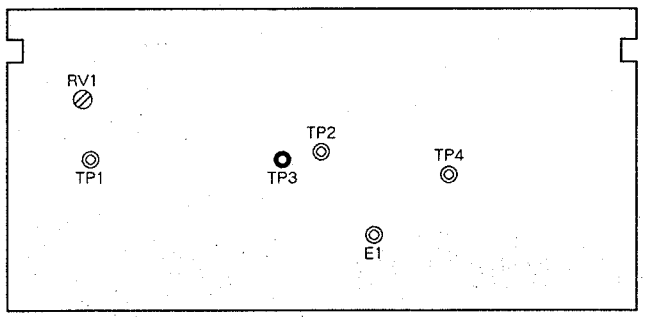


2. Open the lens iris.
3. Adjust ⊘ RV7 so that the video level at TP3 (GND: E1) on the PR-146 board is 600 mV.





PR-146 BOARD (A SIDE)



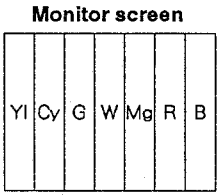
TG-83/P BOARD (A SIDE)

4-3-2. Color Mixture Compensation Adjustment

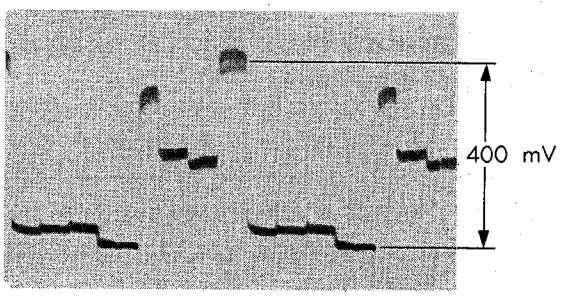
Subject: Color bar chart
Equipment: Oscilloscope
To be extended: PR-146 board
Trigger: HD (TP3/TG-83 (83P) board)
Adj. point: ⊘ RV5/PR-146 board

Adjustment Procedure

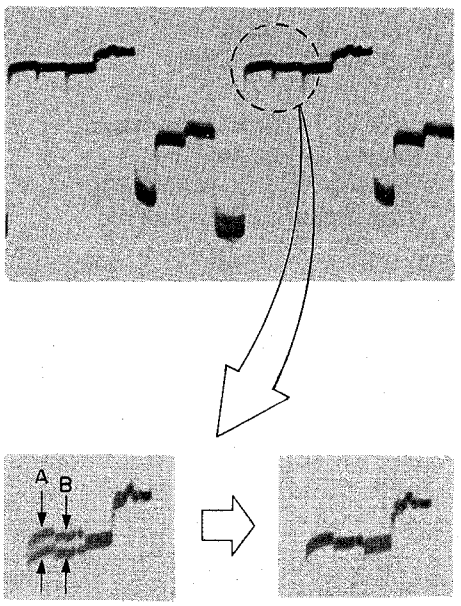
1. Adjust the zoom control of the lens so that the chart frame matches the underscanned monitor frame.



2. Adjust the lens iris so that the video level at TP2 (GND: E2) on the PR-146 board is 400 mV.



3. Adjust the video waveform at pin 35 (GND: pin 22) on the extension board with ⊘ RV5 so that the fluctuation of portions A (Red) and B (Magenta) is minimum.

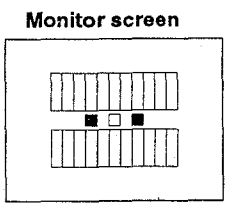


4-3-3. Gain Adjustment

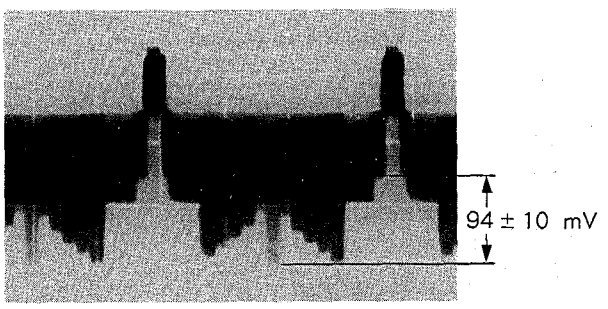
Subject: Gray scale chart
Equipment: Oscilloscope
To be extended: PR-146 board
Trigger: HD (TP3/TG-83 (83P) board)

Adjustment Procedure

1. Adjust the zoom control of the lens so that the chart frame matches the underscanned monitor frame.

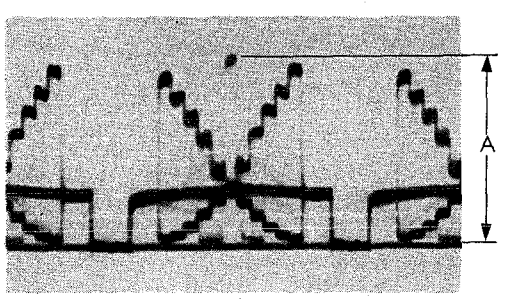


2. Adjust the lens iris so that the video level at TP1 (GND: E1) on the PR-146 board is 94 ± 10 mV.



3. While selecting the GAIN switch of the camera in sequence, adjust so that the video level at TP2 (GND: E2) on the PR-146 board meets the specifications. (Adjust in order of 12dB, 6dB, 0dB.)

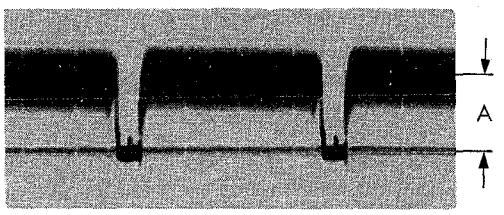
GAIN switch	Adj. point	Specification
12 dB	◐RV2/PR-146	A = 1000 ± 20 mV
6 dB	◐RV3/PR-146	A = 500 ± 10 mV
0 dB	◐RV4/PR-146	A = 250 ± 10 mV

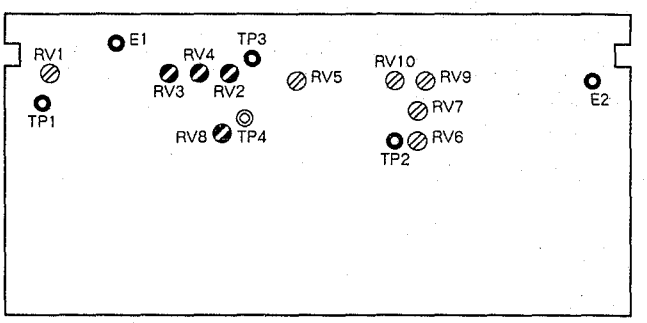


Note: After adjustment, set GAIN switch to "0dB" position.

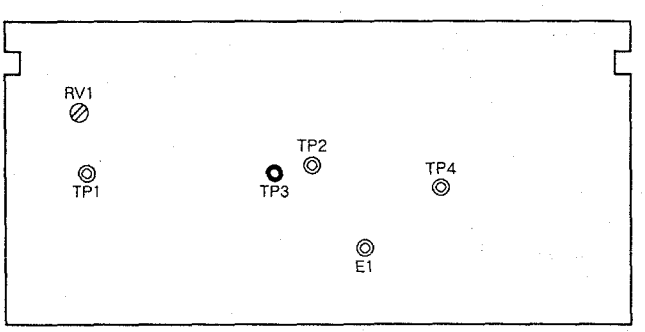
4-3-4. Pedestal Adjustment

Lens iris: Close "C"
Equipment: Oscilloscope
To be extended: PR-146 board
Test point: TP3 (GND: E1)/PR-146 board
Trigger: HD (TP3/TG-83 (83P) board)
Adj. point: ◐RV8/PR-146 board
Spec.: A=30 ± 10 mV





PR-146 BOARD (A SIDE)



TG-83/P BOARD (A SIDE)

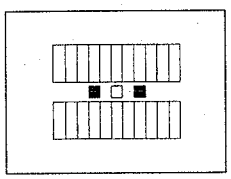
4-3-5. Gamma Pre-adjustment

Subject: Gray scale chart
Equipment: Oscilloscope
To be extended: PR-146 board
Trigger: HD (TP3/TG-83 (83P) board)
Adj. point: ◐ RV6/PR-146 board

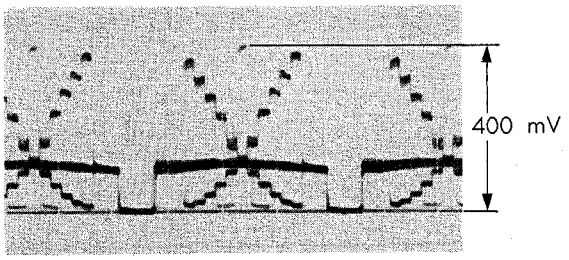
Adjustment Procedure

1. Adjust the zoom control of the lens so that the chart frame matches the underscanned monitor frame.

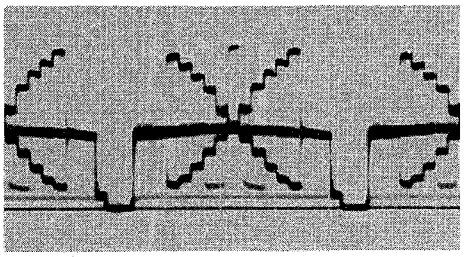
Monitor screen

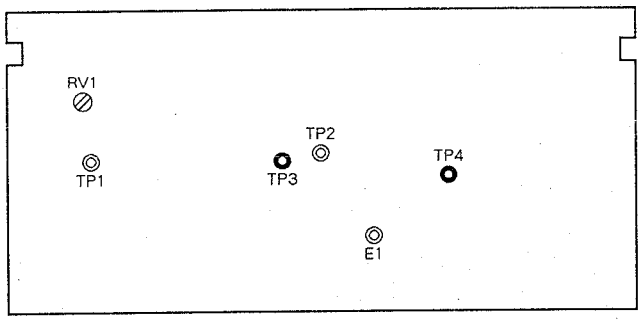


2. Adjust the lens iris so that the video level at TP2 (GND: E2) on the PR-146 board is 400 mV.

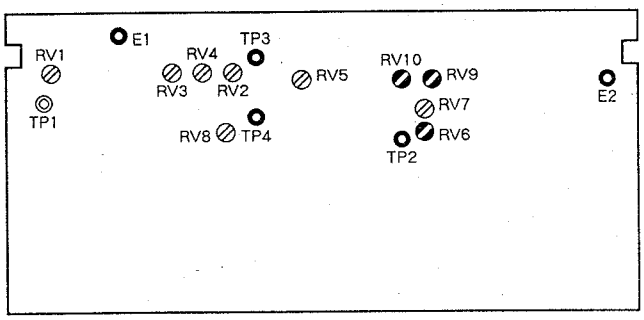


3. Observe the waveform at TP3 (GND: E1) on the PR-146 board and adjust ◐ RV6 so that the gamma curvature becomes a straight line.





TG-83/P BOARD (A SIDE)



PR-146 BOARD (A SIDE)

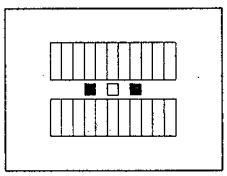
4-3-6. White Balance Pre-adjustment

Subject: Gray scale chart
Equipment: Oscilloscope
To be extended: PR-146 board
Trigger: ID (TP4/TG-83 (83P) board)
Adj. point: ◐ RV9/PR-146 board
◐ RV10/PR-146 board

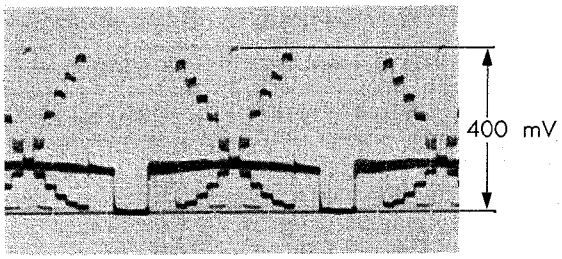
Adjustment Procedure

1. Adjust the zoom control of the lens so that the chart frame matches the underscanned monitor frame.

Monitor screen



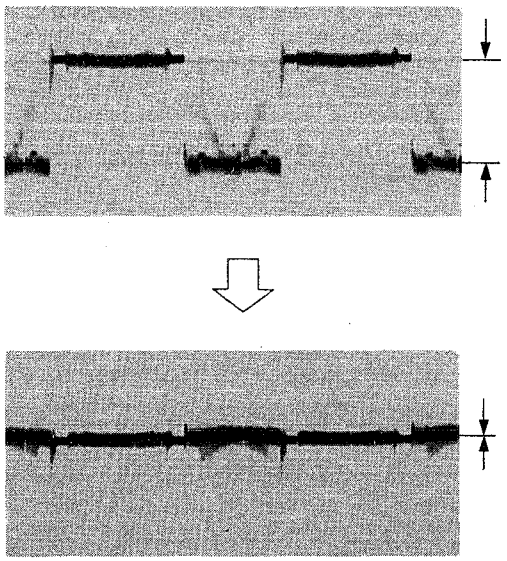
2. Adjust the lens iris so that the video level at TP2 (GND: E2) on the PR-146 board is 400 mV.

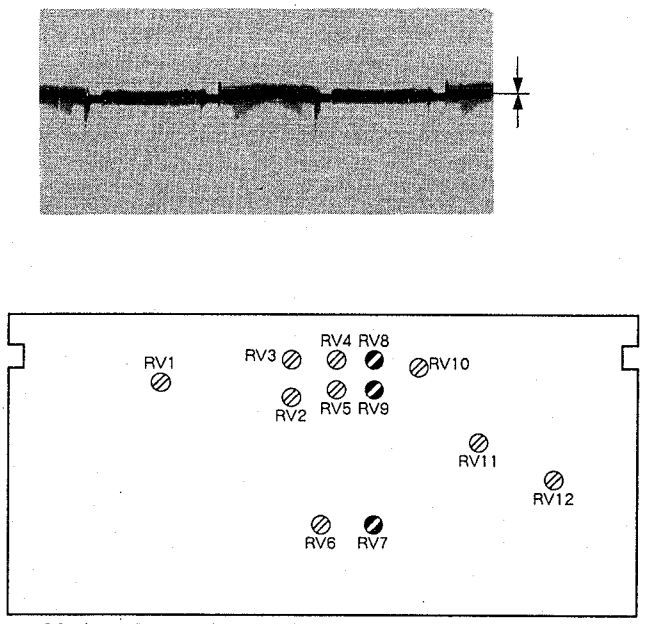


3. Set the oscilloscope to GAIN ADD mode and to CH-2 INVERT mode.

4. Connect CH-1 and CH-2 of oscilloscope to TP3 (GND: E1) on the PR-146 board. Adjust CH2-VAR control on the oscilloscope so that the waveform becomes flat for gain correction.

5. Connect CH-1 of oscilloscope to TP3 (GND: E1) and CH-2 to TP4 (GND: E2) on the PR-146 board. Adjust ◐ RV9 and ◐ RV10 alternately so that the waveform becomes flat.

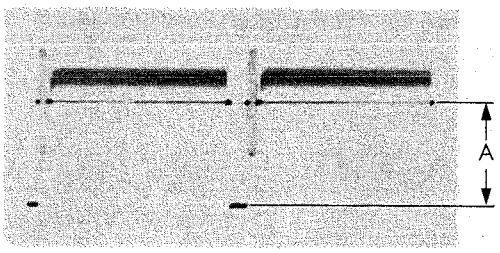




EN-96/P BOARD (A SIDE)

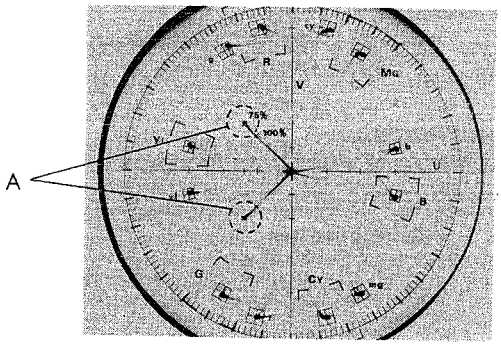
4-3-7. SYNC Level Adjustment

Lens iris: Close "C"
Equipment: Waveform monitor
To be extended: EN-96 (96P) board
Test point: VIDEO OUT
Adj. point: ◐ RV9/EN-96 (96P) board
Spec.: A=40 ± 2 IRE (for NTSC)
300 ± 10 mV (for PAL)



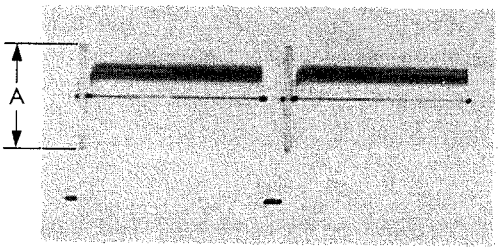
4-3-8. Burst Quadrature Adjustment (for PAL)

Lens iris: Close "C"
Equipment: Vectorscope
To be extended: EN-96P board
Test point: VIDEO OUT
Preparation:
• Vectorscope → "PAL" mode
Adj. point: ◐ RV6/EN-96P board
PHASE control on the vectorscope
Adjustment Procedure
• The beam spots "A" of the burst signal shall be adjusted with the scale of the vectorscope.



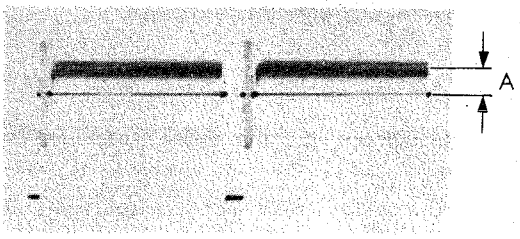
4-3-9. Burst Level Adjustment

Lens iris: Close "C"
Equipment: Waveform monitor
To be extended: EN-96 (96P) board
Test point: VIDEO OUT
Adj. point: ◐ RV7/EN-96 (96P) board
Spec.: A=40 ± 2 IRE (for NTSC)
300 ± 10 mV (for PAL)



4-3-10. Setup Level Adjustment

Lens iris: Close "C"
Equipment: Waveform monitor
To be extended: EN-96 (96P) board
Test point: VIDEO OUT
Adj. point: ◐ RV8/EN-96 (96P) board
Spec.: A=3.0 ± 1 IRE (for NTSC)
20 ± 5 mV (for PAL)



4-3-11. White Clip Pre-adjustment

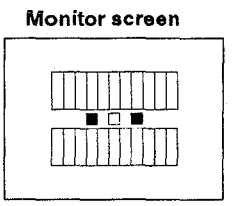
Note: Since this adjustment and the following adjustments are influenced each other. Therefore, when this adjustment is carried out, repeat the following adjustments until all specifications are conformed.

4-3-12. White Clip Adjustment
4-3-13. Y Level Adjustment
4-3-14. Gamma Adjustment

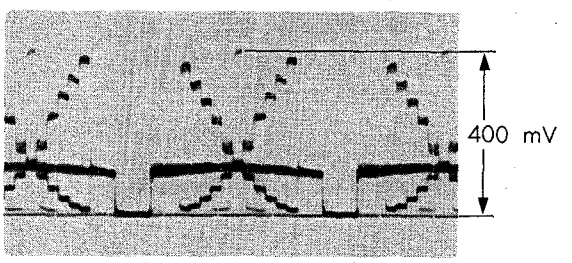
Subject: Gray scale chart
Equipment: Oscilloscope
To be extended: PR-146 board
Trigger: HD (TP3/TG-83 (83P) board)
Adj. point: ⊘ RV7/PR-146 board

Adjustment Procedure

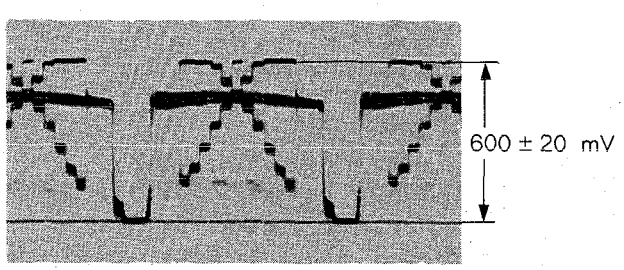
1. Adjust the zoom control of the lens so that the chart frame matches the underscanned monitor frame.



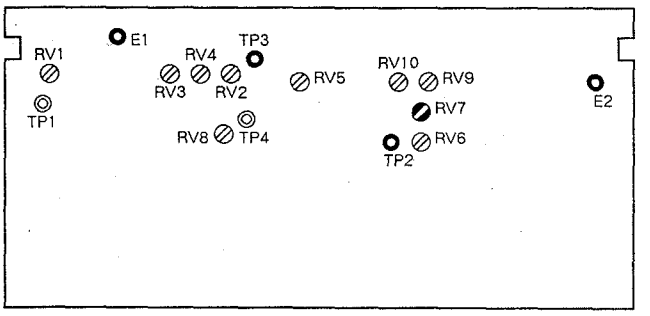
2. Adjust the lens iris so that the video level at TP2 (GND: E2) on the PR-146 board is 400 mV.



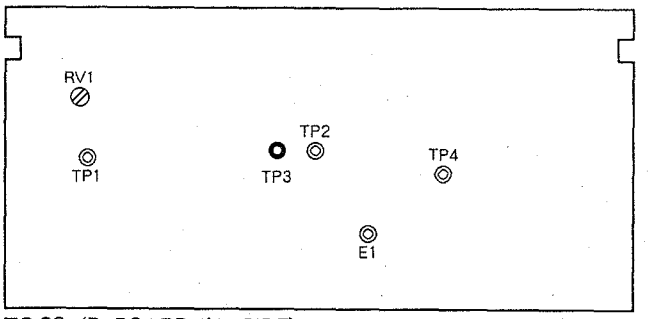
3. Set the GAIN switch on the camera to "12dB" position.
4. Adjust ⊘ RV7 so that the the video level at TP3 (GND: E1) on the PR-146 board is 600 ± 20 mV.



Note: After adjustment, set the GAIN switch to "0dB" position.



PR-146 BOARD (A SIDE)



TG-83/P BOARD (A SIDE)

4-3-12. White Clip Adjustment

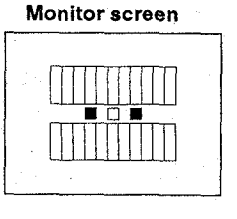
Note: Since this adjustment and the following adjustments are influenced each other. Therefore, when this adjustment is carried out, repeat the following adjustments until all the specifications are conformed.

4-3-11. White Clip Pre-adjustment
4-3-13. Y Level Adjustment
4-3-14. Gamma Adjustment

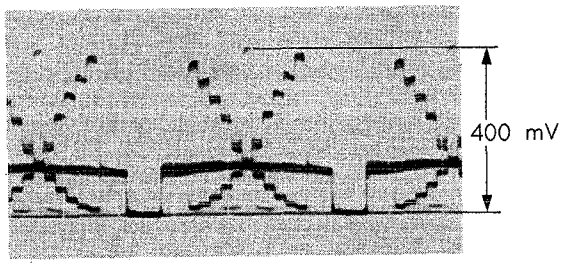
Subject: Gray scale chart
Equipment: Oscilloscope
To be extended: EN-96 (96P) board
Trigger: HD (TP3/TG-83 (83P) board)
Adj. point: ⊘ RV5/EN-96 (96P) board

Adjustment Procedure

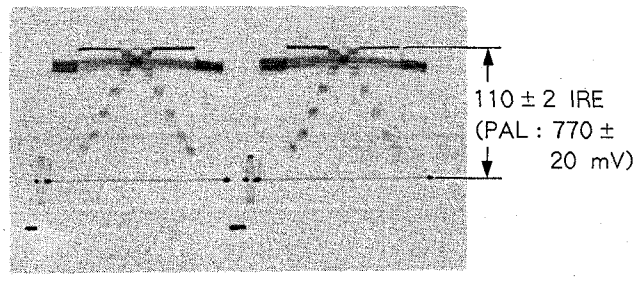
1. Adjust the zoom control of the lens so that the chart frame matches the underscanned monitor frame.



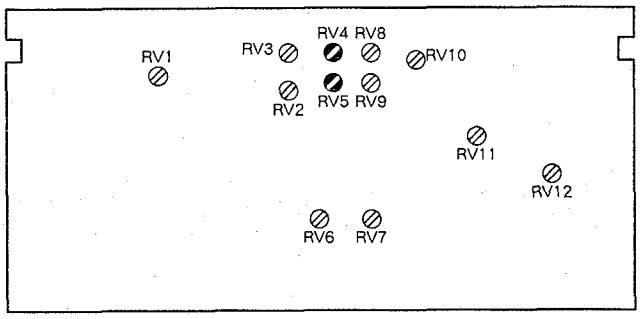
2. Adjust the lens iris so that the video level at TP2 (GND: E2) on the PR-146 board is 400 mV.



3. Set the GAIN switch on the camera to "12dB" position.
4. Adjust ◐ RV5 so that the the video level at the VIDEO OUT connector of the camera is 110 ± 2 IRE (PAL: 770 ± 20 mV).



Note: After adjustment, set the GAIN switch to "0dB" position.



EN-96/P BOARD (A SIDE)

4-3-13. Y Level Adjustment

Note: Since this adjustment and the following adjustments are influenced each other. Therefore, when this adjustment is carried out, repeat the following adjustments until all specifications are conformed.

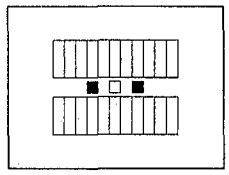
4-3-11. White Clip Pre-adjustment
4-3-12. White Clip Adjustment
4-3-14. Gamma Adjustment

Subject: Gray scale chart
Equipment: Waveform monitor
To be extended: EN-96 (96P) board
Trigger: HD (TP3/TG-83 (83P) board)
Adj. point: ◐ RV4/EN-96 (96P) board

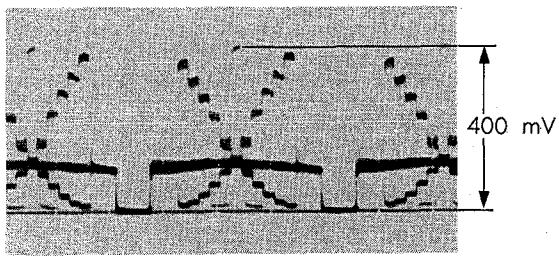
Adjustment Procedure

1. Adjust the zoom control of the lens so that the chart frame matches the underscanned monitor frame.

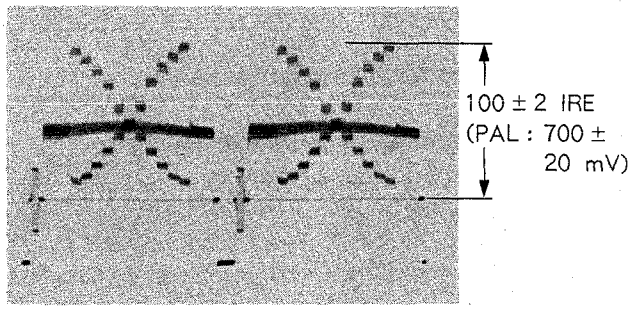
Monitor screen



2. Adjust the lens iris so that the video level at TP2 (GND: E2) on the PR-146 board is 400 mV.



3. Adjust ◐ RV4 so that the the video level at the VIDEO OUT connector of the camera is 100 ± 2 IRE(PAL: 700 ± 20 mV).



4-3-14. Gamma Adjustment

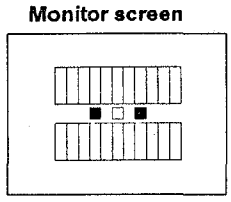
Note: Since this adjustment and the following adjustments are influenced each other. Therefore, when this adjustment is carried out, repeat the following adjustments until all the specifications are conformed.

4-3-11. White Clip Pre-adjustment
4-3-12. White Clip Adjustment
4-3-13. Y Level Adjustment

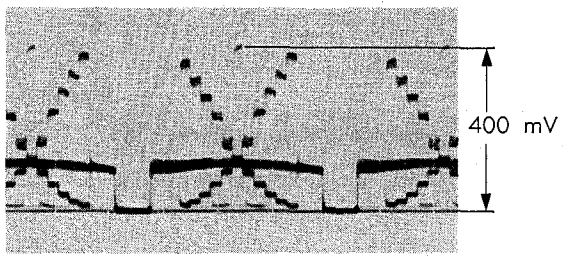
Subject: Gray scale chart
Equipment: Waveform monitor
To be extended: EN-96 (96P) board
Trigger: HD (TP3/TG-83 (83P) board)
Adj. point: ◐ RV6/PR-146 board
◐ RV4/EN-96 (96P) board

Adjustment Procedure

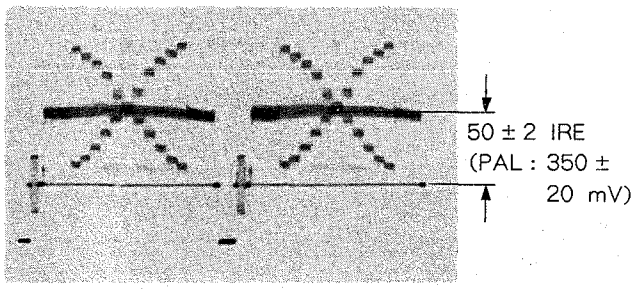
1. Adjust the zoom control of the lens so that the chart frame matches the underscanned monitor frame.

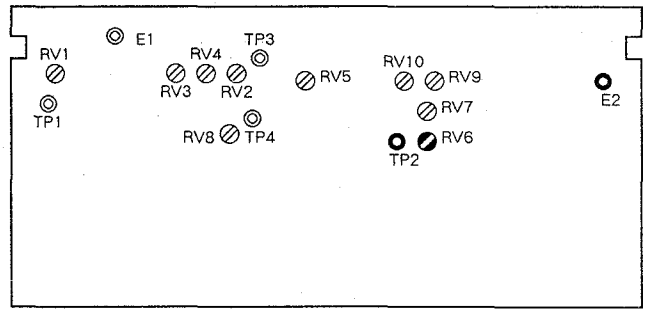


2. Adjust the lens iris so that the video level at TP2 (GND: E2) on the PR-146 board is 400 mV.

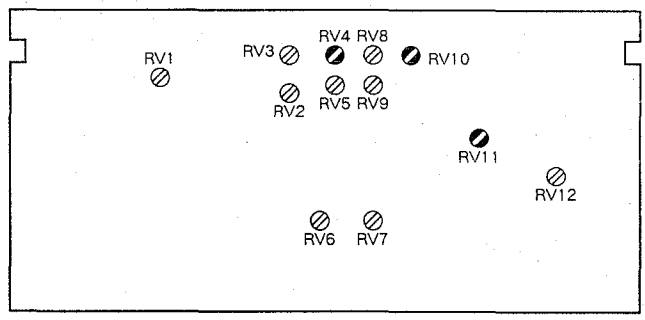


3. Observe the waveform at the VIDEO OUT connector of the camera. Adjust ◐ RV6 on the PR-146 board and ◐ RV4 on the EN-96 (96P) board so that the cross point of the gray scale is 50 ±2 IRE (PAL: 350±10 mV).

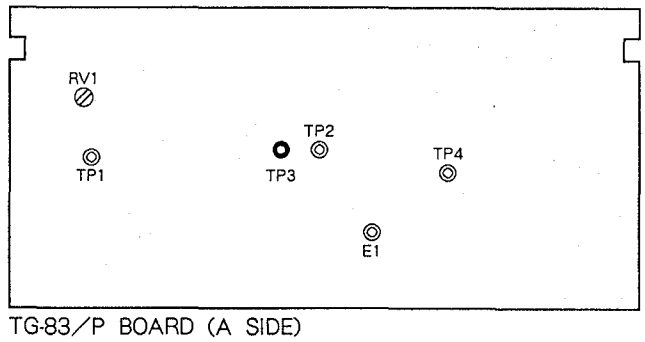




PR-146 BOARD (A SIDE)



EN-96/P BOARD (A SIDE)



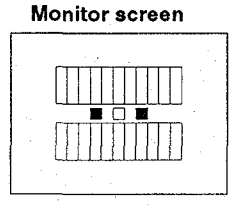
TG-83/P BOARD (A SIDE)

4-3-15. Y Gain Adjustment

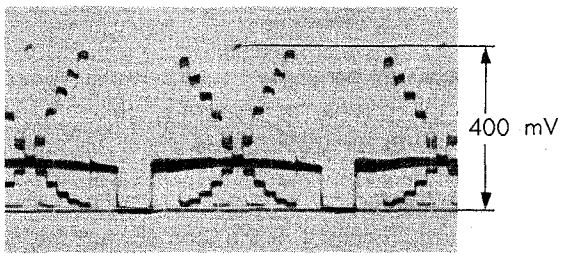
Subject: Gray scale chart
Equipment: Waveform monitor
To be extended: EN-96 (96P) board
Trigger: HD (TP3/TG-83 (83P) board)

Adjustment Procedure

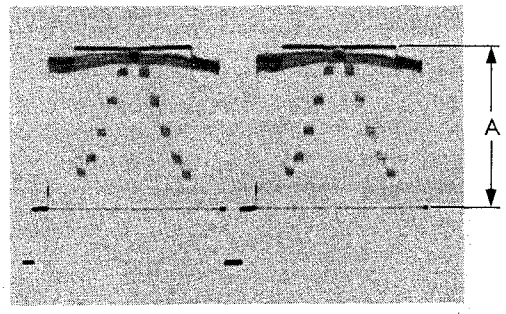
1. Adjust the zoom control of the lens so that the chart frame matches the underscanned monitor frame.



2. Adjust the lens iris so that the video level at TP2 (GND: E2) on the PR-146 board is 400 mV.



3. Set the GAIN switch on the camera to "12dB" position.
4. **Test point:** Y OUT (terminate with 75-ohm)
   (pin 6 (GND:pin 1) of D-SUB connector)
   Adj. point: ◐ RV10/EN-96 (96P) board
   Spec.: A=110 ± 2 IRE (for NTSC)
   770 ± 20 mV (for PAL)



Note: After adjustment, set the GAIN switch to "0dB" position.

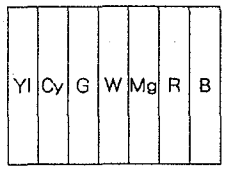
4-3-16. Chroma Gain Adjustment

Subject: Color bar chart
Equipment: Waveform monitor
To be extended: EN-96 (96P) board
Trigger: HD (TP3/TG-83 (83P) board)

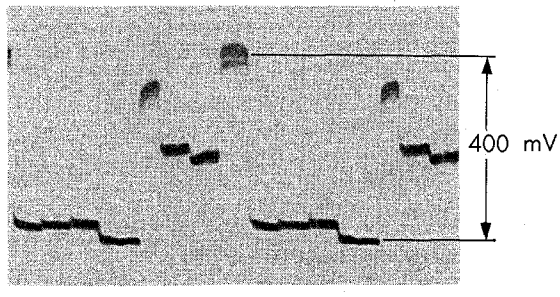
Adjustment Procedure

1. Adjust the zoom control of the lens so that the chart frame matches the underscanned monitor frame.

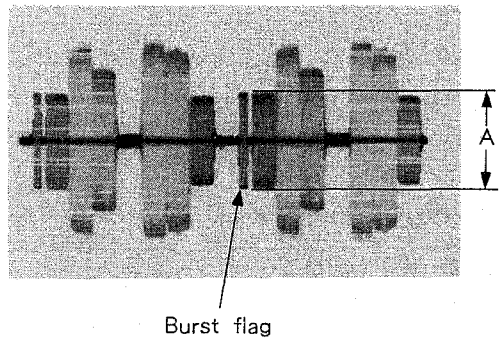
Monitor screen



2. Adjust the lens iris so that the video level at TP2 (GND: E2) on the PR-146 board is 400 mV.



3. **Test point:** CHROMA OUT (terminate with 75-ohm)
   (pin 9 (GND: pin 1) of D-SUB connector)
   Adj. point: ◐ RV11/EN-96 (96P) board
   Spec.: A=40 ± 2 IRE (for NTSC)
   300 ± 10 mV (for PAL)

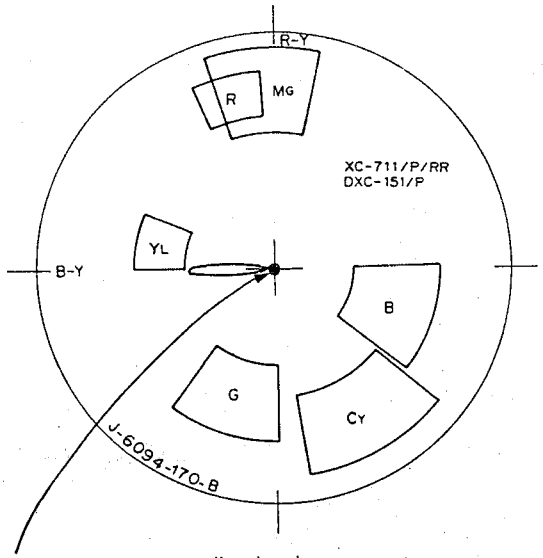


4-3-17. Multiplex Adjustment

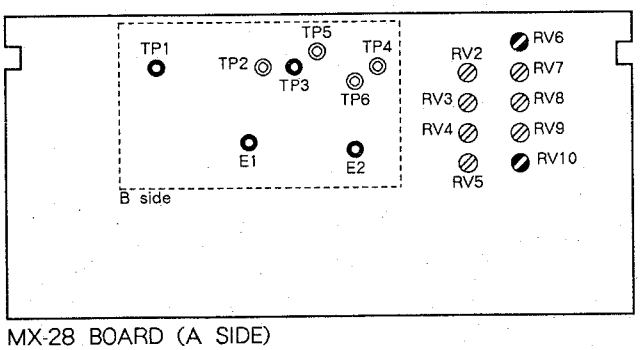
Lens iris: Close "C"
Equipment: Vectorscope
To be extended: MX-28 board
Test point: VIDEO OUT
Adj. point: ⊘ RV6/MX-28 board

Adjustment Procedure

1. Adjust ⊘ RV6 so that there is no split in the beam spot.



Be sure not to split the beam spot.



MX-28 BOARD (A SIDE)

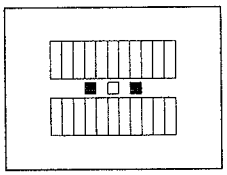
4-3-18. G1 Gain Adjustment

Subject: Gray scale chart
Equipment: Oscilloscope
Waveform monitor
To be extended: MX-28 board
Trigger: ID (TP4/TG-83 (83P) board)
Adj. point: ⊘ RV10/MX-28 board

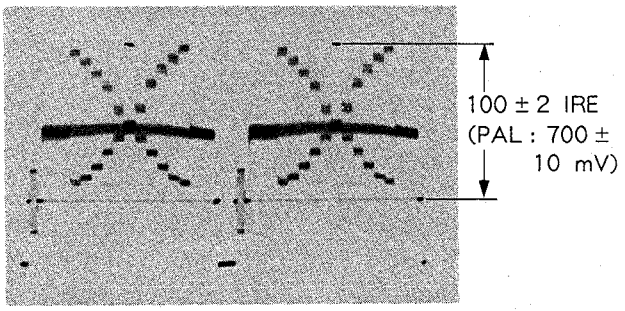
Adjustment Procedure

1. Adjust the zoom control of the lens so that the chart frame matches the underscanned monitor frame.

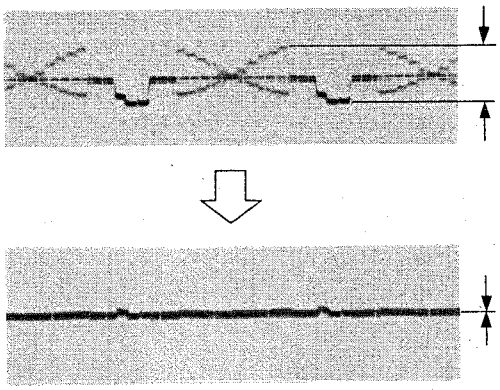
Monitor screen



2. Adjust the lens iris so that the video level at VIDEO OUT connector is 100 ± 2 IRE (PAL: 700 ± 10 mV).



3. Set oscilloscope to GAIN ADD mode and to CH-2 INVERT mode.
4. Connect CH-1 and CH-2 of oscilloscope to TP1 (GND: E1) on the MX-28 board. Adjust CH2-VAR control on the oscilloscope so that the waveform becomes flat for gain correction.
5. Connect CH-1 of oscilloscope to TP1 (GND: E1) and CH-2 to TP3 (GND: E2) on the MX-28 board. Adjust ⊘ RV10 so that the waveform becomes flat.

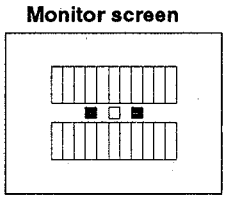


4-3-19. G2 Gain Adjustment

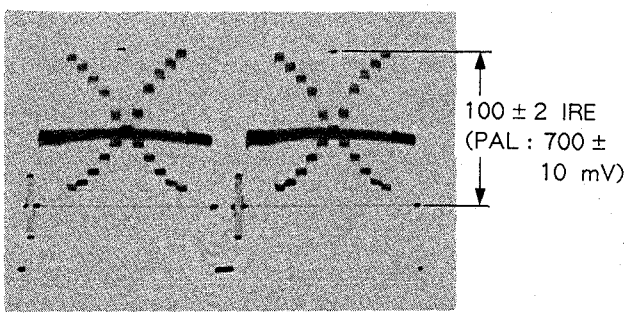
Subject: Gray scale chart
Equipment: Oscilloscope
Waveform monitor
To be extended: MX-28 board
Trigger: ID (TP4/TG-83(83P) board)
Adj. point: ⊘ RV8/MX-28 board

Adjustment Procedure

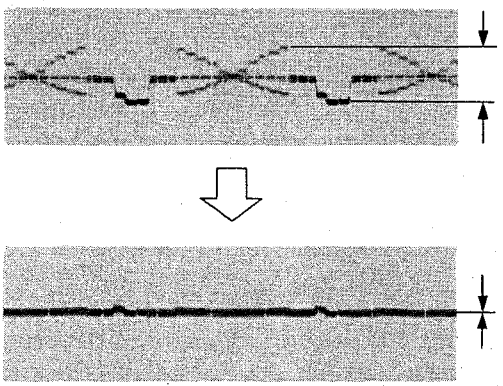
1. Adjust the zoom control of the lens so that the chart frame matches the underscanned monitor frame.

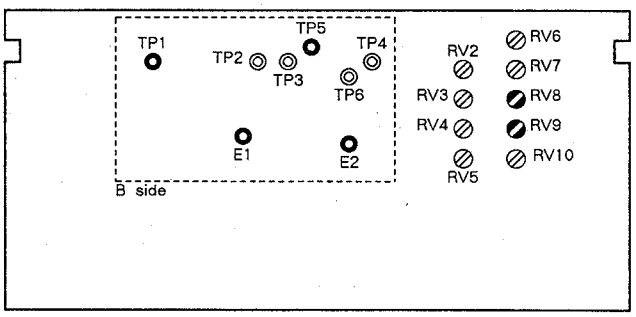


2. Adjust the lens iris so that the video level at VIDEO OUT connector is 100 ± 2 IRE (PAL: 700 ± 10 mV).

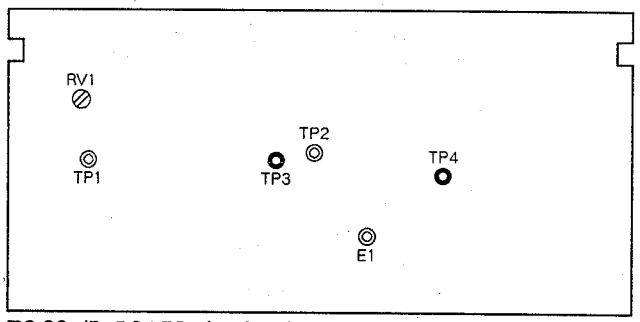


3. Set oscilloscope to GAIN ADD mode and to CH-2 INVERT mode.
4. Connect CH-1 and CH-2 of oscilloscope to TP1 (GND: E1) on the MX-28 board. Adjust CH2-VAR control on the oscilloscope so that the waveform becomes flat for gain correction.
5. Connect CH-1 of oscilloscope to TP1 (GND: E1) and CH-2 to TP5 (GND: E2) on the MX-28 board. Adjust ⊘ RV8 so that the waveform becomes flat.





MX-28 BOARD (A SIDE)



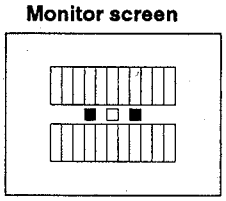
TG-83/P BOARD (A SIDE)

4-3-20. R1/B1 Gain Adjustment

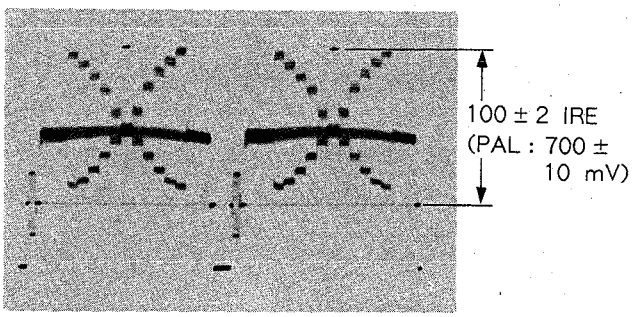
Subject: Gray scale chart
Equipment: Oscilloscope
Waveform monitor
To be extended: MX-28 board
Trigger: ID (TP4/TG-83 (83P) board)
Adj. point: ⊘ RV9/MX-28 board

Adjustment Procedure

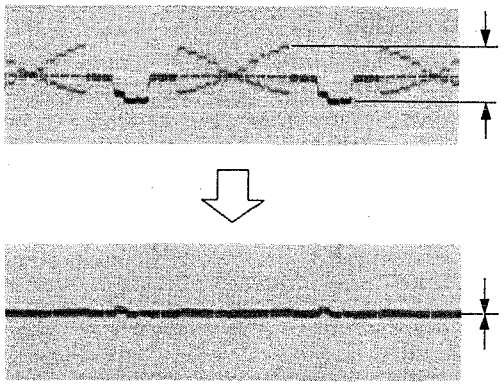
1. Adjust the zoom control of the lens so that the chart frame matches the underscanned monitor frame.



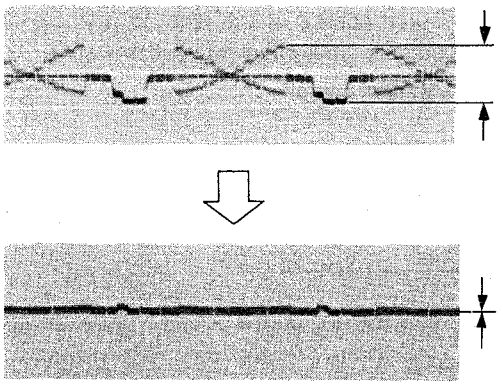
2. Adjust the lens iris so that the video level at VIDEO OUT connector is 100 ± 2 IRE (PAL: 700 ± 10 mV).



3. Set oscilloscope to GAIN ADD mode and to CH-2 INVERT mode.
4. Connect CH-1 and CH-2 of oscilloscope to TP2 (GND: E1) on the MX-28 board. Adjust CH2-VAR control on the oscilloscope so that the waveform becomes a straight line.
5. Connect CH-1 of oscilloscope to TP2 (GND: E1) and CH-2 to TP4 (GND: E2) on the MX-28 board. Adjust ◐ RV9 so that the waveform becomes a straight line.



3. Set oscilloscope to GAIN ADD mode and to CH-2 INVERT mode.
4. Connect CH-1 and CH-2 of oscilloscope to TP2 (GND: E1) on the MX-28 board. Adjust CH2-VAR control on the oscilloscope so that the waveform becomes flat for gain correction.
5. Connect CH-1 of oscilloscope to TP2 (GND: E1) and CH-2 to TP6 (GND: E2) on the MX-28 board. Adjust ◐ RV7 so that the waveform becomes flat.

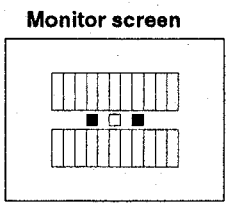


4-3-21. R2/B2 Gain Adjustment

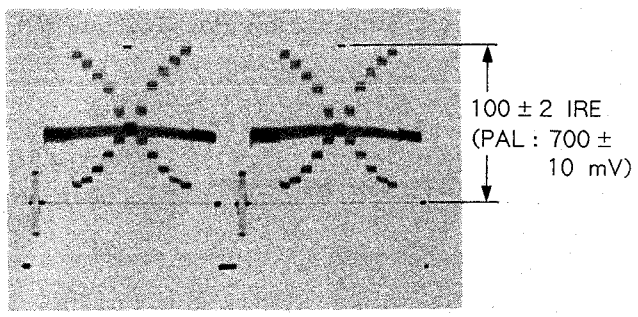
Subject: Gray scale chart
Equipment: Oscilloscope
Waveform monitor
To be extended: MX-28 board
Trigger: ID (TP4/TG-83(83P) board)
Adj. point: ◐ RV7/MX-28 board

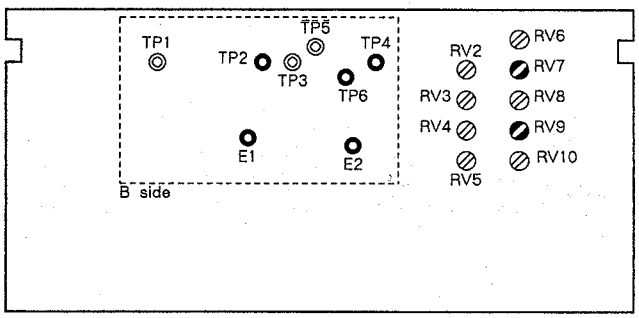
Adjustment Procedure

1. Adjust the zoom control of the lens so that the chart frame matches the underscanned monitor frame.

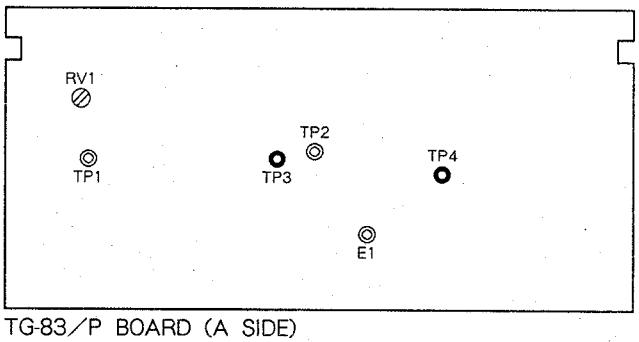


2. Adjust the lens iris so that the video level at VIDEO OUT connector is 100 ± 2 IRE (PAL: 700 ± 10 mV).





MX-28 BOARD (A SIDE)



TG-83/P BOARD (A SIDE)

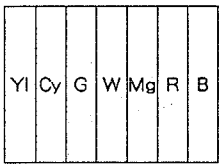
4-3-22. White Balance Adjustment

Subject: Color bar chart
Equipment: Waveform monitor
To be extended: PR-146 board
Test point: VIDEO OUT
Adj. point: ⊘ RV9/PR-146 board
⊘ RV10/PR-146 board

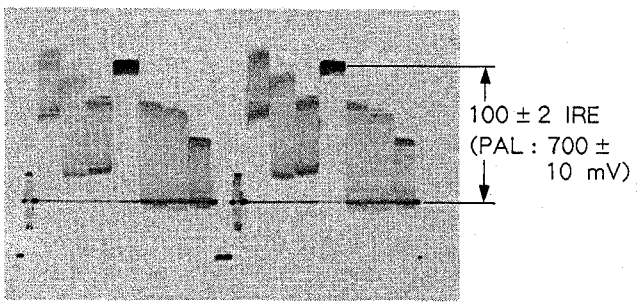
Adjustment Procedure

1. Adjust the zoom control of the lens so that the chart frame matches the underscanned monitor frame.

Monitor screen

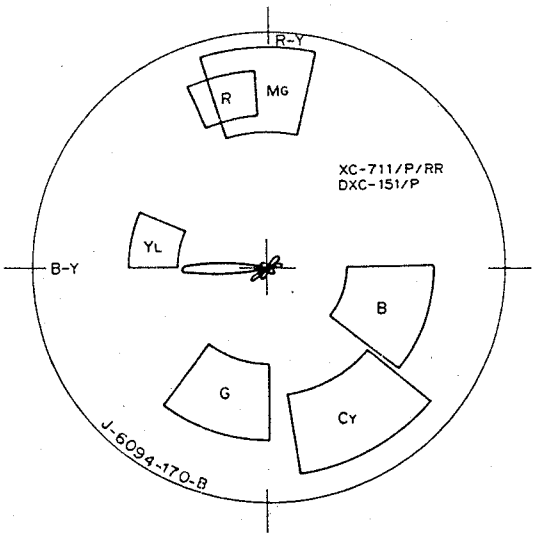


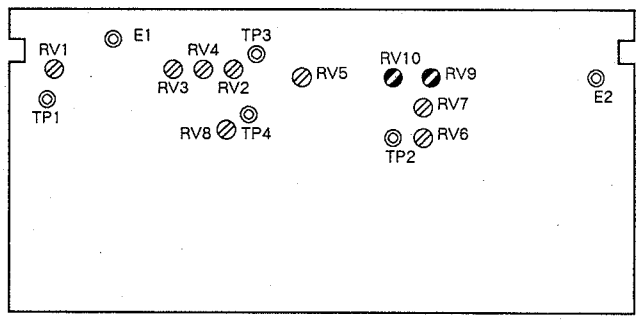
2. Adjust the lens iris so that the video level at VIDEO OUT connector is 100 ± 2 IRE(PAL: 700 ± 10 mV).



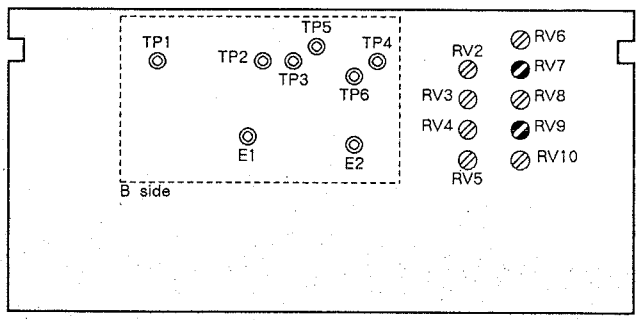
3. Adjust ⊘ RV9 and ⊘ RV10/PR-146 board so that the white beam spot stays in the center of the vectorscope screen.

> When the white beam spot is split, readjust the following controls.
> ⊘ RV7/MX-28 board
> ⊘ RV9/MX-28 board





PR-146 BOARD (A SIDE)



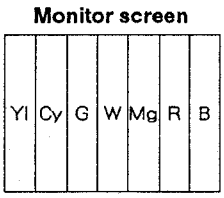
MX-28 BOARD (A SIDE)

4-3-23. HUE Adjustment

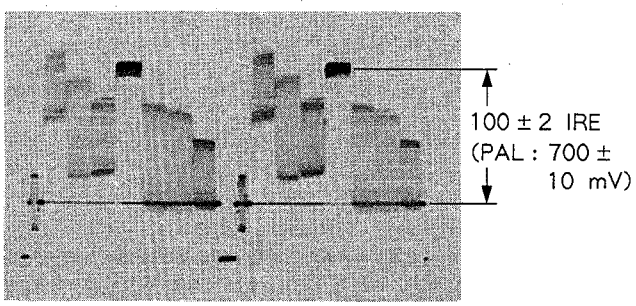
Subject: Color bar chart
Equipment: Waveform monitor
Vectorscope
To be extended: MX-28 board
Test point: VIDEO OUT
Preparation: RESPONSE switch
(on the waveform monitor) → "LUM"

Adjustment Procedure

1. Adjust the zoom control of the lens so that the chart frame matches the underscanned monitor frame.

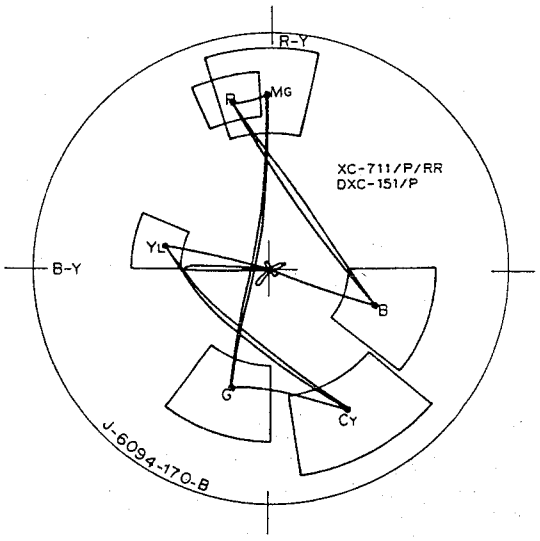


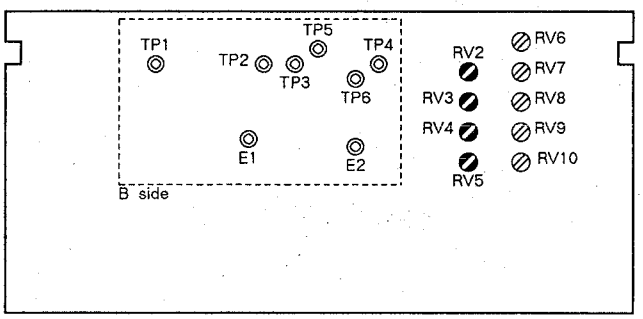
2. Adjust the lens iris so that the video level at VIDEO OUT connector is 100 ± 2 IRE (PAL: 700 ± 10 mV).



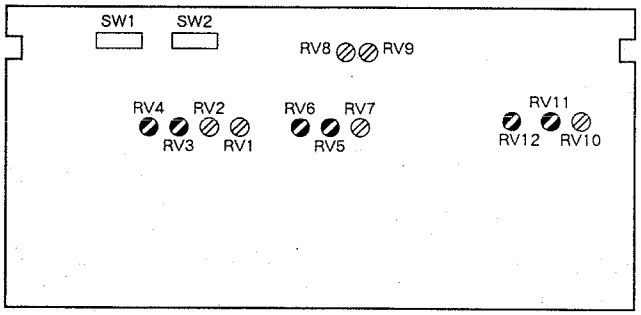
3. If the white balance on the vectorscope is not correct, set the WHITE BAL switch to "AUTO" position then press the AUTO WHITE BAL button.

4. Adjust the following controls alternately so that each beam spot stays inside the reference frame.
   - RV2 (B–Y HUE)/MX-28 board
   - RV3 (R–Y HUE)/MX-28 board
   - RV4 (B–Y GAIN)/MX-28 board
   - RV5 (R–Y GAIN)/MX-28 board





MX-28 BOARD (A SIDE)



RD-18 BOARD (A SIDE)

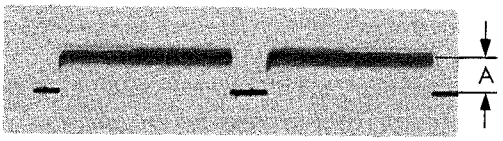
4-4. RGB SYSTEM ADJUSTMENT

4-4-1. Setup Level Adjustment

Lens iris: Close "C"
Equipment: Waveform monitor
To be extended: RD-18 board

Adjustment Procedure

	Test Point D-SUB connector	Adj. Point RD-18	Specification
G	G OUT Pin 4 (GND : pin 1)	RV3	A = 3.0 ± 1 IRE (for NTSC) 20 ± 10 mV (for PAL)
R	R OUT Pin 3 (GND : pin 2)	RV11	
B	B OUT Pin 5 (GND : pin 8)	RV5	



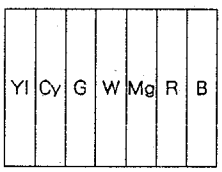
4-4-2. RGB Level Adjustment

Subject: Color bar chart
Equipment: Waveform monitor
To be extended: RD-18 board
Test point: VIDEO OUT
Preparation: RESPONSE switch (on the waveform monitor) → "LUM"

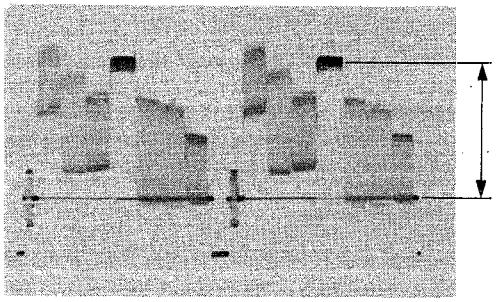
Adjustment Procedure

1. Adjust the zoom control of the lens so that the chart frame matches the underscanned monitor frame.

Monitor screen



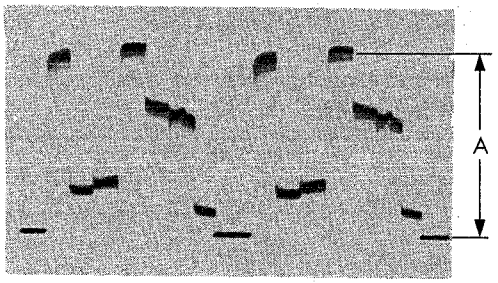
2. Adjust the lens iris so that the video level at VIDEO OUT connector is 100 ± 2 IRE (PAL: 700 ± 10 mV).



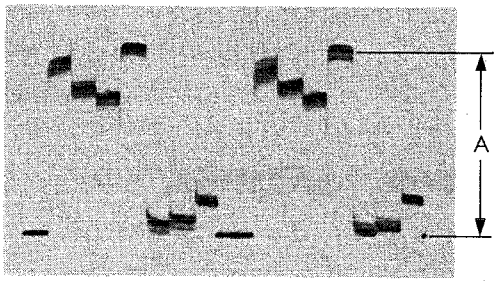
3.

	Test Point D-SUB connector	Adj. Point RD-18	Specification
G	G OUT Pin 4 (GND : pin 1)	RV4	A = 100 ± 2 IRE (for NTSC) 700 ± 10mV (for PAL)
R	R OUT Pin 3 (GND : pin 2)	RV12	
B	B OUT Pin 5 (GND : pin 8)	RV6	

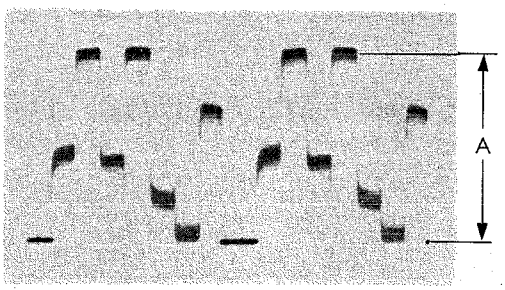
R OUT



G OUT



B OUT

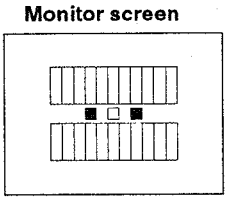


4-4-3. White Clip Level Adjustment

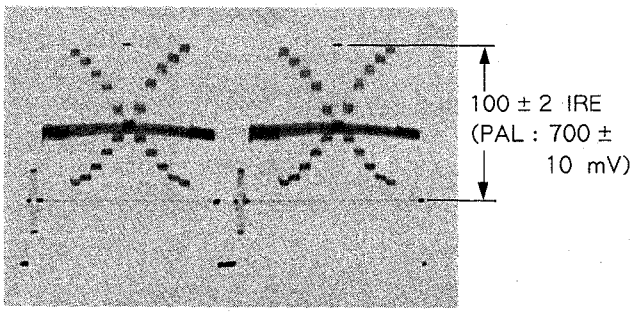
Subject: Gray scale chart
Equipment: Waveform monitor
To be extended: RD-18 board

Adjustment Procedure

1. Adjust the zoom control of the lens so that the chart frame matches the underscanned monitor frame.

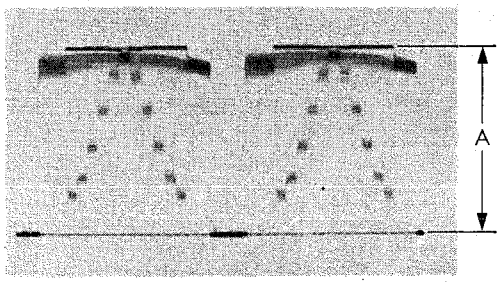


2. Adjust the lens iris so that the video level at VIDEO OUT connector is 100 ± 2 IRE (PAL: 700 ± 10 mV).



3. Set the GAIN switch on the camera to "12dB" position.
4. Adjust the white clip level.

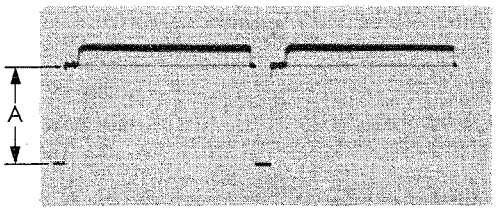
	Test Point D-SUB connector	Adj. Point RD-18	Specification
G	G OUT Pin 4 (GND : pin 1)	⊘RV1	A = 110 ± 2 IRE
R	R OUT Pin 3 (GND : pin 2)	⊘RV10	
B	B OUT Pin 5 (GND : pin 8)	⊘RV7	



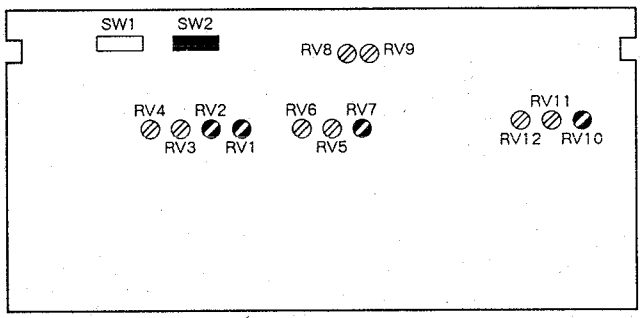
Note: After adjustment, set the GAIN switch to "0dB" position.

4-4-4. G ON SYNC Level Adjustment

Equipment: Waveform monitor
To be extended: RD-18 board
Test point: G OUT (terminate with 75-ohm)
(pin 4(GND: pin 1) of D-SUB connector)
Preparation: SW2 (G SYNC ON/OFF)/RD-18 → "ON"
Adj. point: ⊘RV2/RD-18 board
Spec.: A=40 ± 1IRE (for NTSC)
300 ± 10 mV (for PAL)



Note: After adjustment, set the switch SW2 (G SYNC ON/OFF) on the RD-18 board to OFF position.



RD-18 BOARD (A SIDE)

4-4-5. RGB Aperture Adjustment

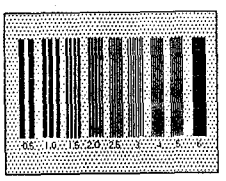
Note: Since the aperture level is very delicate against the focus, be sure to adjust the best focus.

Subject: In mega chart
Equipment: Waveform monitor
To be extended: RD-18 board
Test point: G OUT (terminate with 75-ohm)
(pin 4 (GND:pin 1) of D-SUB connector)
Adj. point: ⊘ RV8/RD-18 board
⊘ RV9/RD-18 board

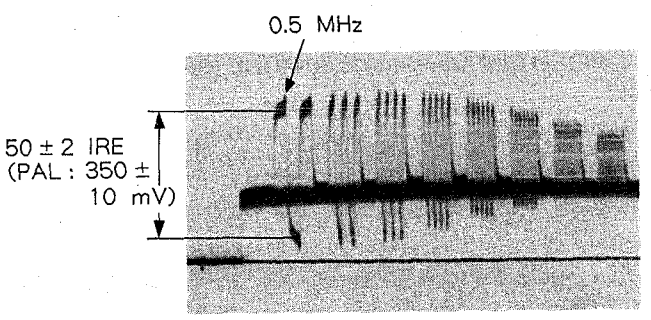
Adjustment Procedure

1. Adjust the zoom control of the lens so that the chart frame matches the underscanned monitor frame.

Monitor screen

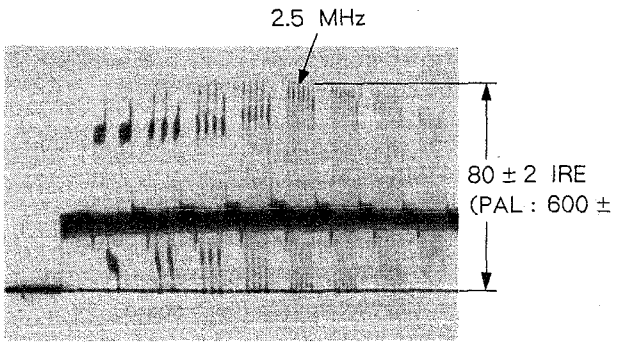


2. Turn ⊘ RV9 fully clockwise.
(Position where the noise component on the video signal is minimum.)
3. Adjust the lens iris so that the level at 0.5 MHz portion of the VIDEO OUT waveform is 50 ± 2 IRE(PAL: 350 ± 10 mV).

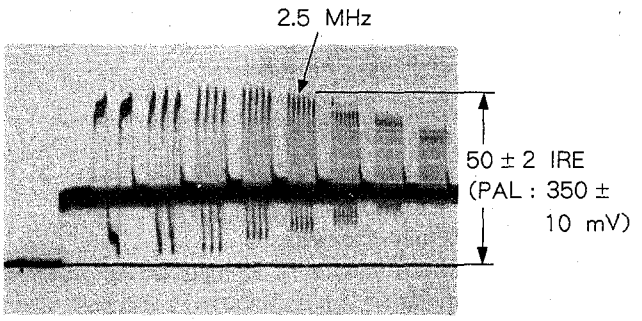


4. Turn ⊘ RV9 fully counterclockwise.
(Position where the noise component on the video signal is maximum.)

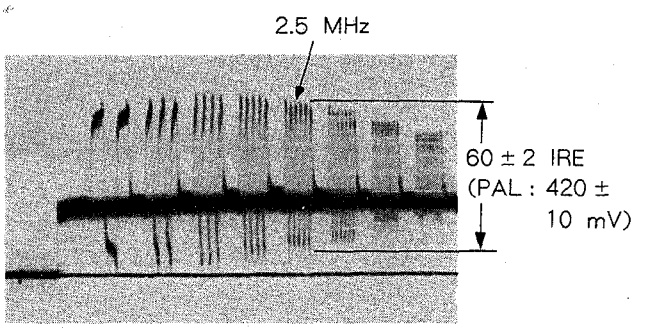
5. Adjust ⊘ RV8 so that the level at 2.5 MHz portion of the VIDEO OUT waveform is 80±2 IRE (PAL: 600±10 mV).

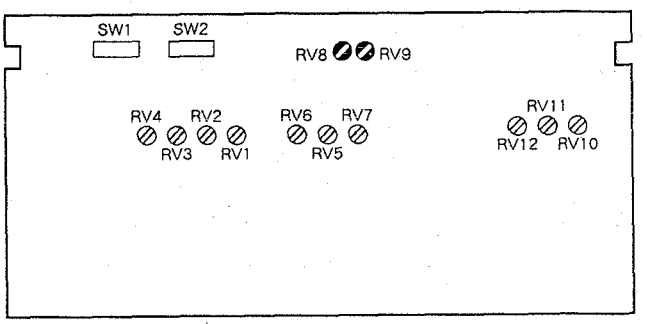


6. Adjust ⊘ RV9 so that the level at 2.5 MHz portion of the VIDEO OUT waveform is 50±2 IRE (PAL: 350±10 mV).



7. Adjust ⊘ RV8 so that the level at 2.5 MHz portion of the VIDEO OUT waveform is 60±2 IRE (PAL: 420±10 mV).





RD-18 BOARD (A SIDE)

4-5. VBS SYSTEM ADJUSTMENT

4-5-1. VBS Aperture Adjustment

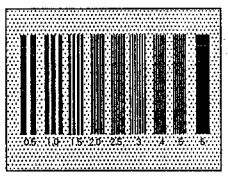
Note: Since the aperture level is very delicate against the focus, be sure to adjust the best focus.

Subject: In mega chart
Equipment: Waveform monitor
To be extended: EN-96 (96P) board
Test point: VIDEO OUT
Adj. point: ⊘ RV2/EN-96 (96P) board
⊘ RV3/EN-96 (96P) board

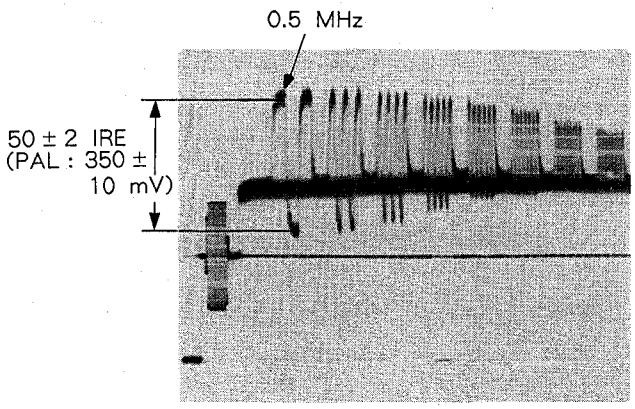
Adjustment Procedure

1. Adjust the zoom control of the lens so that the chart frame matches the underscanned monitor frame.

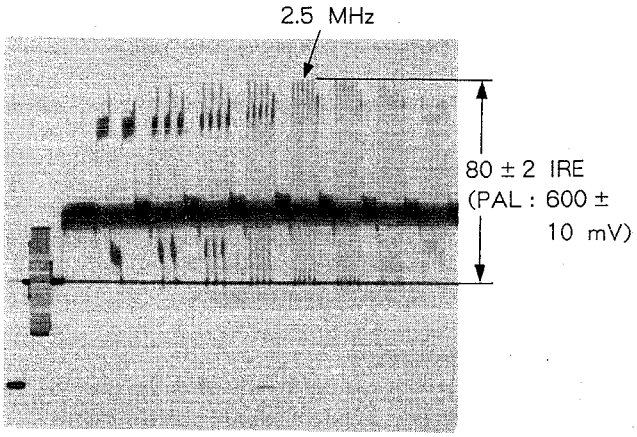
Monitor screen



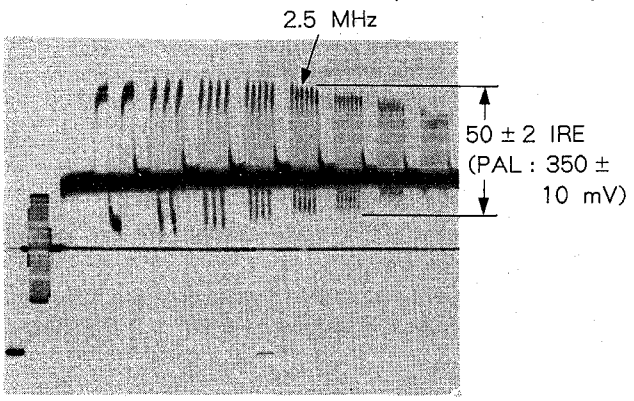
2. Turn ⊘ RV2 fully clockwise.
(Position where the noise component on the video signal is minimum.)
3. Adjust the lens iris so that the level at 0.5 MHz portion of the VIDEO OUT waveform is 50 ± 2 IRE (PAL: 350 ± 10 mV).



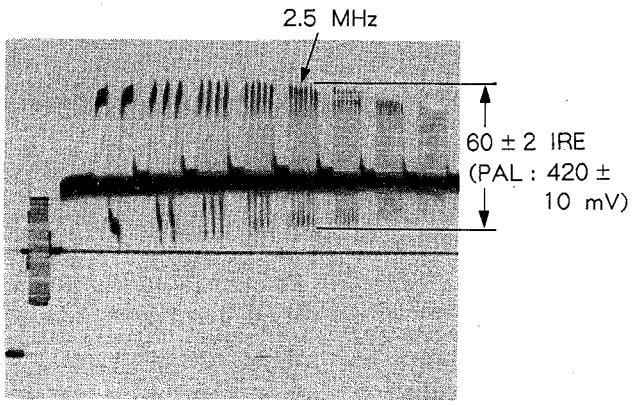
4. Turn ⊘ RV2 fully counterclockwise.
(Position where the noise component on the video signal is maximum.)
5. Adjust ⊘ RV3 so that the level at 2.5 MHz portion of the VIDEO OUT waveform is 80±2 IRE (PAL: 600±10 mV).

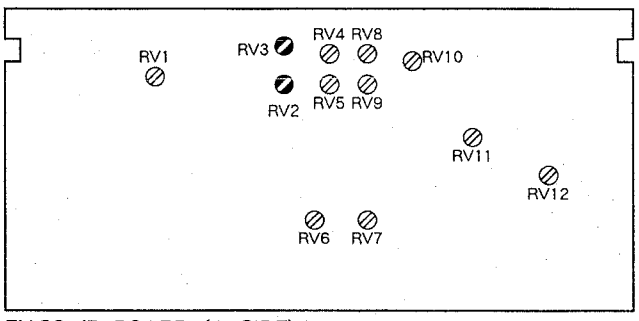


6. Adjust ⊘ RV2 so that the level at 2.5 MHz portion of the VIDEO OUT waveform is 50±2 IRE (PAL: 350±10 mV).



7. Adjust ⊘ RV3 so that the level at 2.5 MHz portion of the VIDEO OUT waveform is 60±2 IRE (PAL: 420±10 mV).





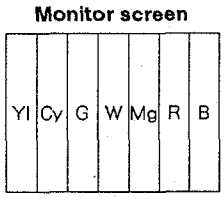
EN-96/P BOARD (A SIDE)

4-5-2. Chroma Suppress Adjustment

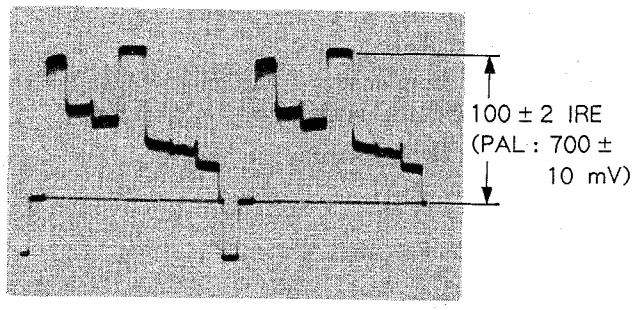
Subject: Color bar chart
Equipment: Waveform monitor
Vectorscope
To be extended: EN-96 (96P) board
Test point: VIDEO OUT
Preparation: RESPONSE switch
(on the waveform monitor) → "LUM"
Adj. point: ◐ RV12/EN-96 (96P) board

Adjustment Procedure

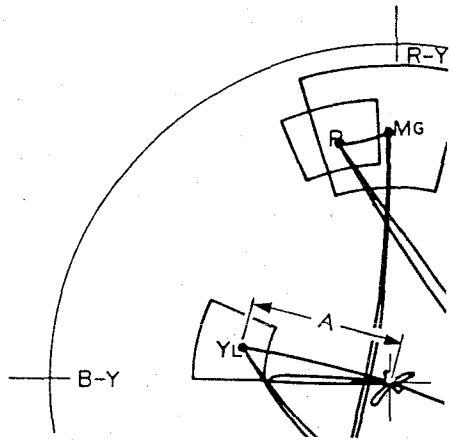
1. Set the GAIN switch on the camera to "0dB" position.
2. Adjust the zoom control of the lens so that the chart frame matches the underscanned monitor frame.



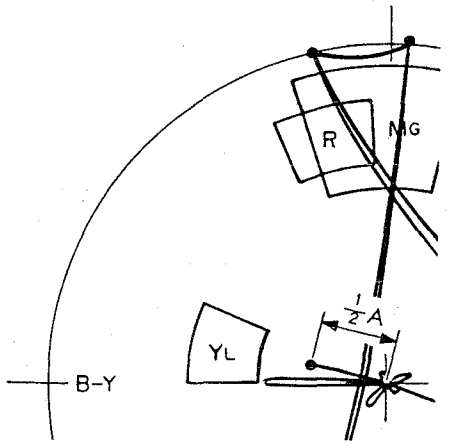
3. Adjust the lens iris so that the video level at VIDEO OUT connector is 100 ± 2 IRE (PAL: 700 ± 10 mV).



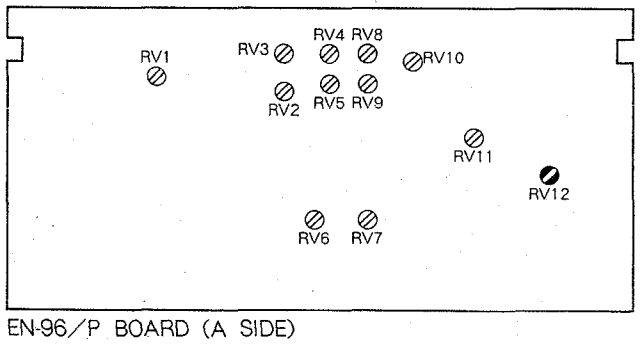
4. Write the Y_L level "A" down.



5. Set the GAIN switch on the camera to "6dB" position.
6. Adjust ◐ RV12 so that the Y_L level on the vectorscope becomes 50% against the level "A".



Note: After adjustment, set the GAIN switch to "0dB" position.



EN-96/P BOARD (A SIDE)

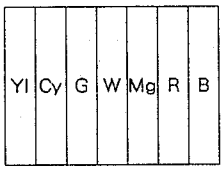
4-5-3. Color Mixture Compensation Fine Adjustment

Subject: Color bar chart
Equipment: Waveform monitor
To be extended: PR-146 board
Test point: VIDEO OUT
Preparation: RESPONSE switch
(on the waveform monitor) → "LUM"
Adj. point: ⊘ RV5/PR-146 board

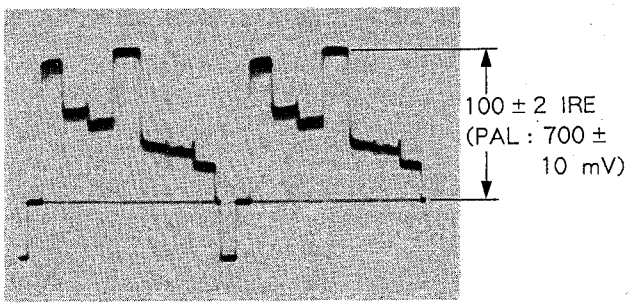
Adjustment Procedure

1. Adjust the zoom control of the lens so that the chart frame matches the underscanned monitor frame.

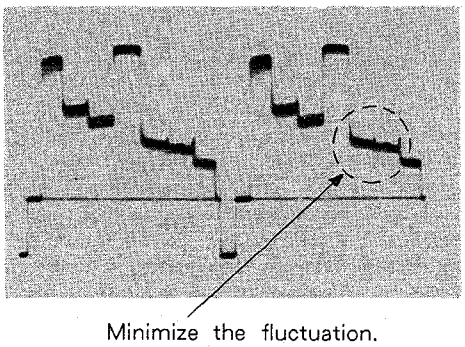
Monitor screen

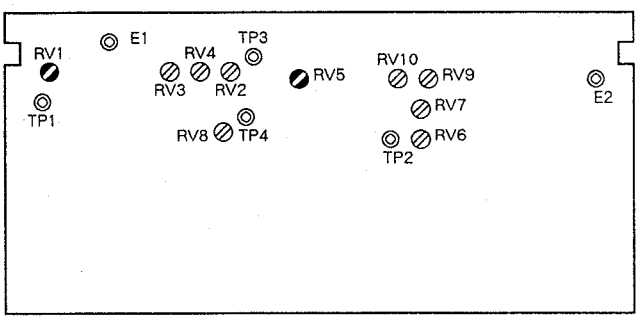


2. Adjust the lens iris so that the video level at VIDEO OUT connectoris 100 ± 2 IRE (PAL: 700 ± 10 mV).



3. Adjust ⊘ RV5 so that the fluctuation of Red and Magenta components on the waveform monitor is minimum.





PR-146 BOARD (A SIDE)

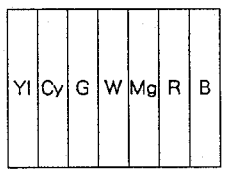
4-5-4. AGC Adjustment

Subject: Color bar chart
Equipment: Waveform monitor
To be extended: PR-146 board
Test point: VIDEO OUT
Preparation: RESPONSE switch
(on the waveform monitor) → "LUM"
GAIN switch/Camera's side panel
→ "0dB"
Adj. point: ⊘ RV1/PR-146 board

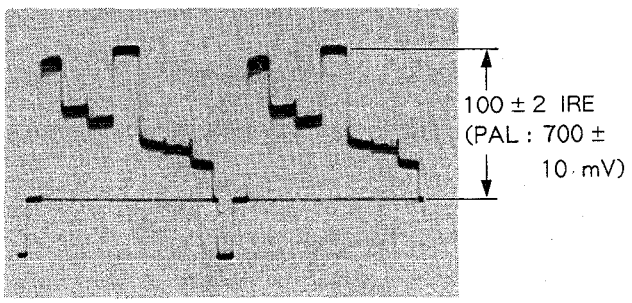
Adjustment Procedure

1. Adjust the zoom control of the lens so that the chart frame matches the underscanned monitor frame.

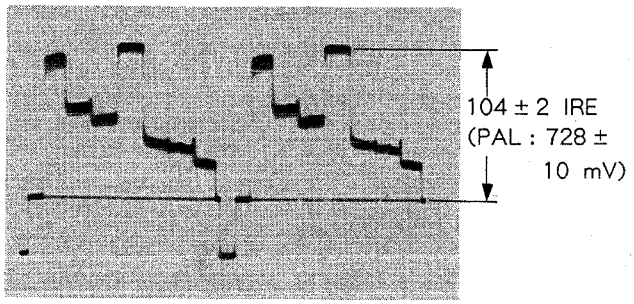
Monitor screen



2. Adjust the lens iris so that the video level at the VIDEO OUT connector is 100 ± 2 IRE (PAL: 700 ± 10 mV).



3. Set the GAIN mode to "AGC".
4. Adjust ⊘ RV1 so that the video level at the VIDEO OUT connector is 104 ± 2 IRE (PAL: 728 ± 10 mV).



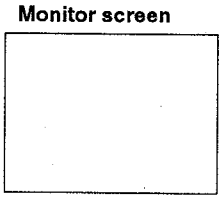
Note: After adjustment, set the GAIN switch to "0dB" position.

4-5-5. Low Light Level Adjustment

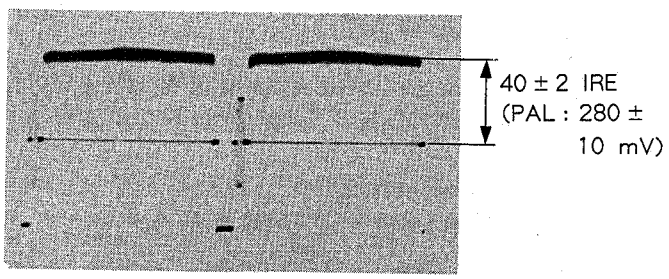
Subject: White window chart
Equipment: Waveform monitor
To be extended: AT-62 board
Test point: Portion A of chip resistor R62/AT-62 board
Adj. point: A001/EVR adjustment fixture (electronic control)

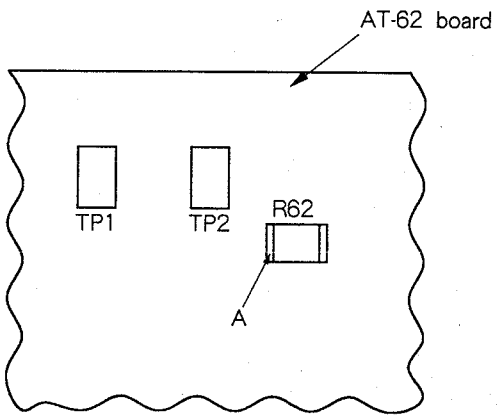
Adjustment Procedure

1. Adjust the zoom control of the lens so that the chart frame matches the underscanned monitor frame.



2. Adjust the lens iris so that the video level at the VIDEO OUT connector is 40 ± 2 IRE (PAL: 280 ± 10 mV).





3. Connect oscilloscope probe at portion A of chip resistor R62. Check that the DC level is 0Vdc.
4. Observe the voltage at portion A of chip resistor R62. Adjust address A001 of the EVR adjustment fixture so that the voltage is approximately 4Vdc.
5. Adjust the lens iris so that the video level at the VIDEO OUT connector is 45 ± 2IRE (PAL: 315 ± 10 mV). Check the DC voltage at portion A of chip resistor R62 is approximately 0Vdc at that time.
6. Adjust the lens iris so that the video level at the VIDEO OUT connector is 40 ± 2IRE (PAL: 280 ± 10 mV). Check the DC voltage at portion A of chip resistor R62 is approximately 4Vdc at that time.
7. Repeat steps 4 to 6 alternately until the specifications in steps 5 and 6 are met.

4-6. WHITE BALANCE SYSTEM ADJUSTMENT

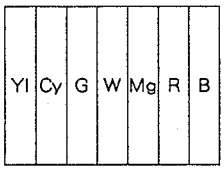
4-6-1. 5600° K Adjustment

Subject: Color bar chart
Equipment: Waveform monitor
Vectorscope
To be extended: PR-146 board
Test point: VIDEO OUT
Preparation: WHITE BALANCE switch/Camera's side panel → "5600"
Put the LB-140 filter on the lens.
Adj. point: ⊘ RV9/PR-146 board
⊘ RV10/PR-146 board

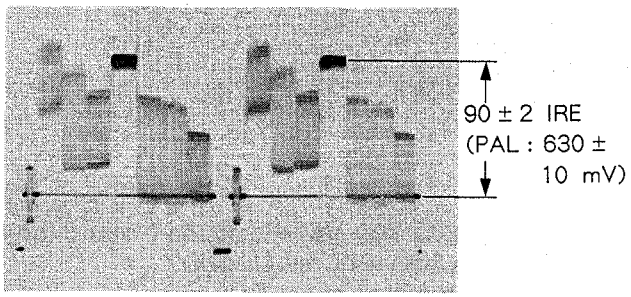
Adjustment Procedure

1. Adjust the zoom control of the lens so that the chart frame matches the underscanned monitor frame.

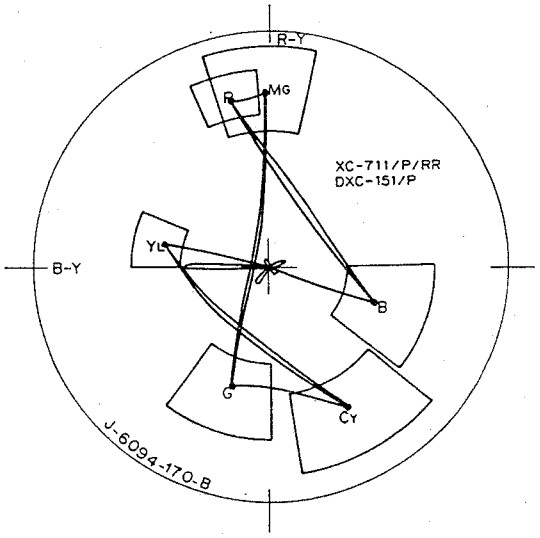
Monitor screen



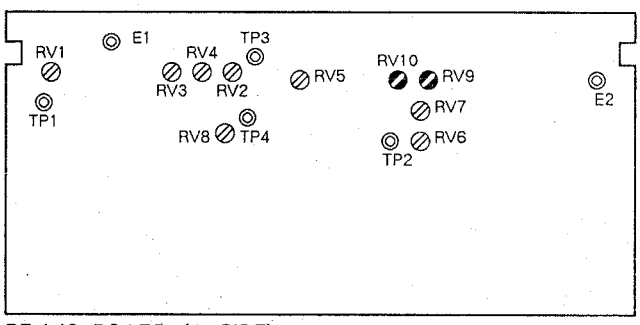
2. Adjust the lens iris so that the video level at the VIDEO OUT connector is 90 ± 2 IRE (PAL: 630 ± 10 mV).



3. Adjust ⊘ RV9 and ⊘ RV10 so that the white beam spot stays in the center of the vectorscope screen.



Note: After adjustment, remove the LB-140 filter and set the WHITE BALANCE switch to "3200" position.



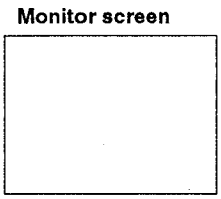
PR-146 BOARD (A SIDE)

4-6-2. Auto Tracing White Balance Offset Adjustment

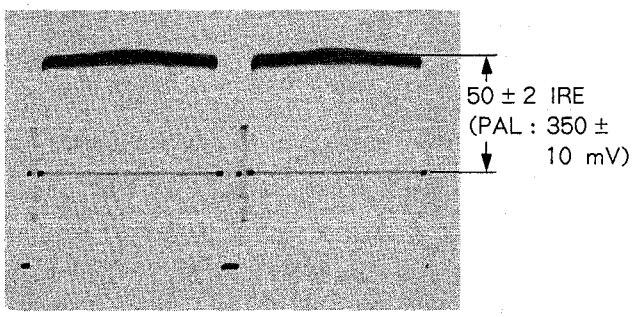
Subject: White window chart
Equipment: Waveform monitor
Vectorscope
Test point: VIDEO OUT
Preparation: WHITE BALANCE switch/Camera's side panel
→ "ATW"
Adj. point: A003/EVR adjustment fixture
A004/EVR adjustment fixture
A014/EVR adjustment fixture

Adjustment Procedure

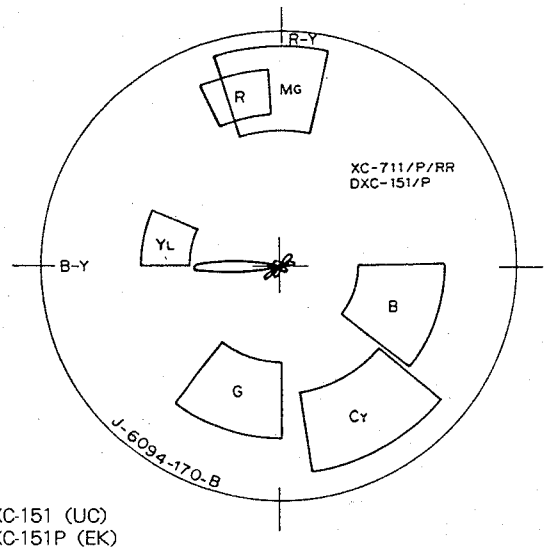
1. Adjust the zoom control of the lens so that the chart frame matches the underscanned monitor frame.



2. Adjust the lens iris so that the video level at the VIDEO OUT connector is 50 ± 2 IRE (PAL: 350 ± 10 mV).



3. Set the data to "000" with address A014 of the EVR adjustment fixture.
4. Adjust addresses A003 and A004 of the EVR adjustment fixture so that the white beam spot stays in the center of the vectorscope screen.



4-6-3. Auto White Balance Hysteresis Data Setting

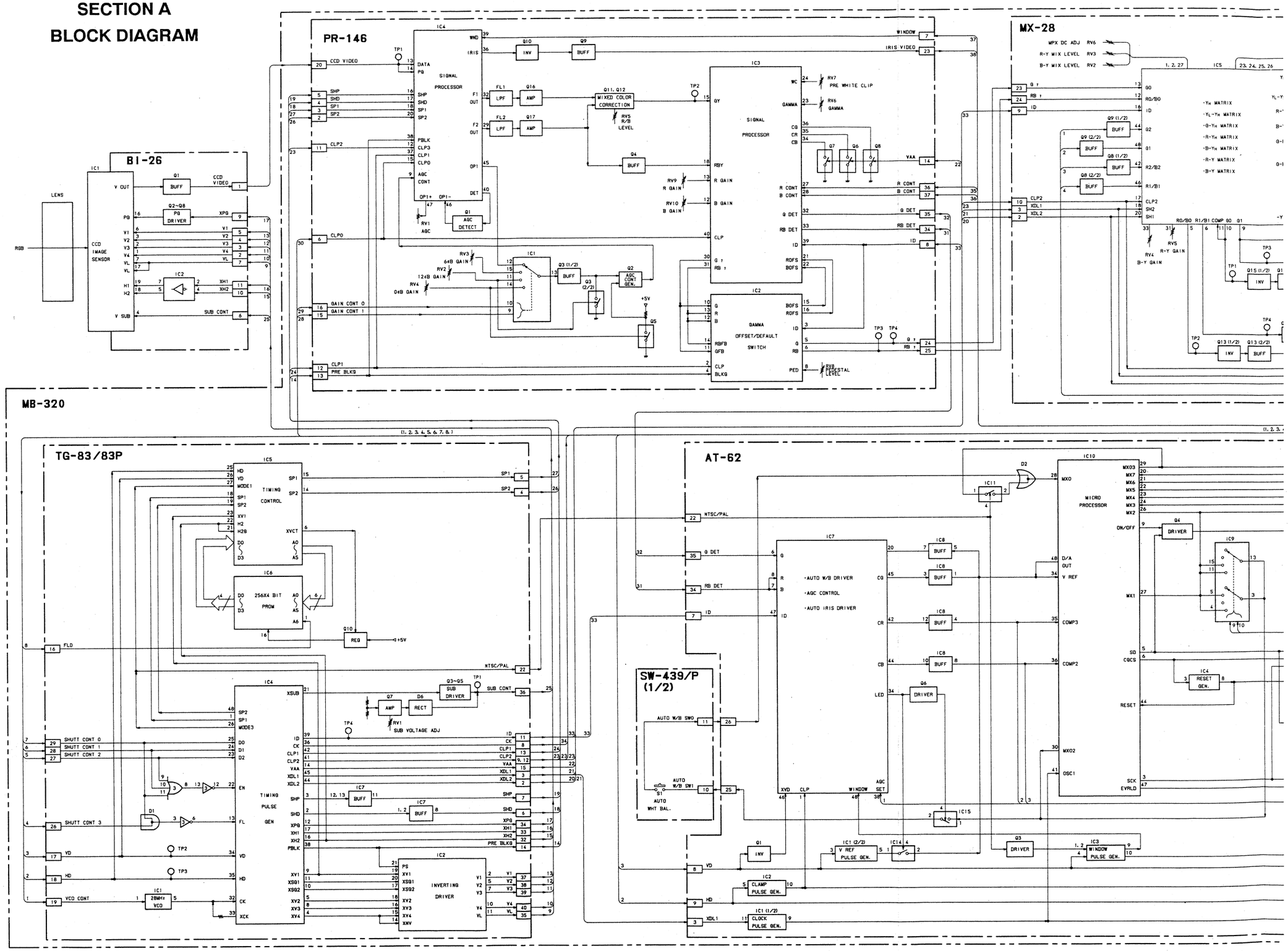
Equipment: Waveform monitor
Test point: VIDEO OUT
Adj. point: A014/EVR adjustment fixture

Adjustment Procedure

1. Check that the data in address A014 of the EVR adjustment fixture is "000".
   If not, set the data to "000", then readjust section 4-6-2.
2. Set data "010" in address A014.
3. Set the EVR adjustment fixture to OFF, then disconnect the EVR adjustment fixture from the unit.

SECTION A
BLOCK DIAGRAM

OVERALL BLOCK



DXC-151 (UC, J)
DXC-151P (EK)

A | B | C | D | E | F | G | H

OVERALL OVERALL

EN-96/96P

SG-177/177P

RD-18

SW-439/P (2/2)

CN-485

OVERALL BLOCK

DXC-151 (UC, J)
DXC-151P (EK)

B-DXC151-OABLOCK/M

A-3

A-4

1

2

3

4

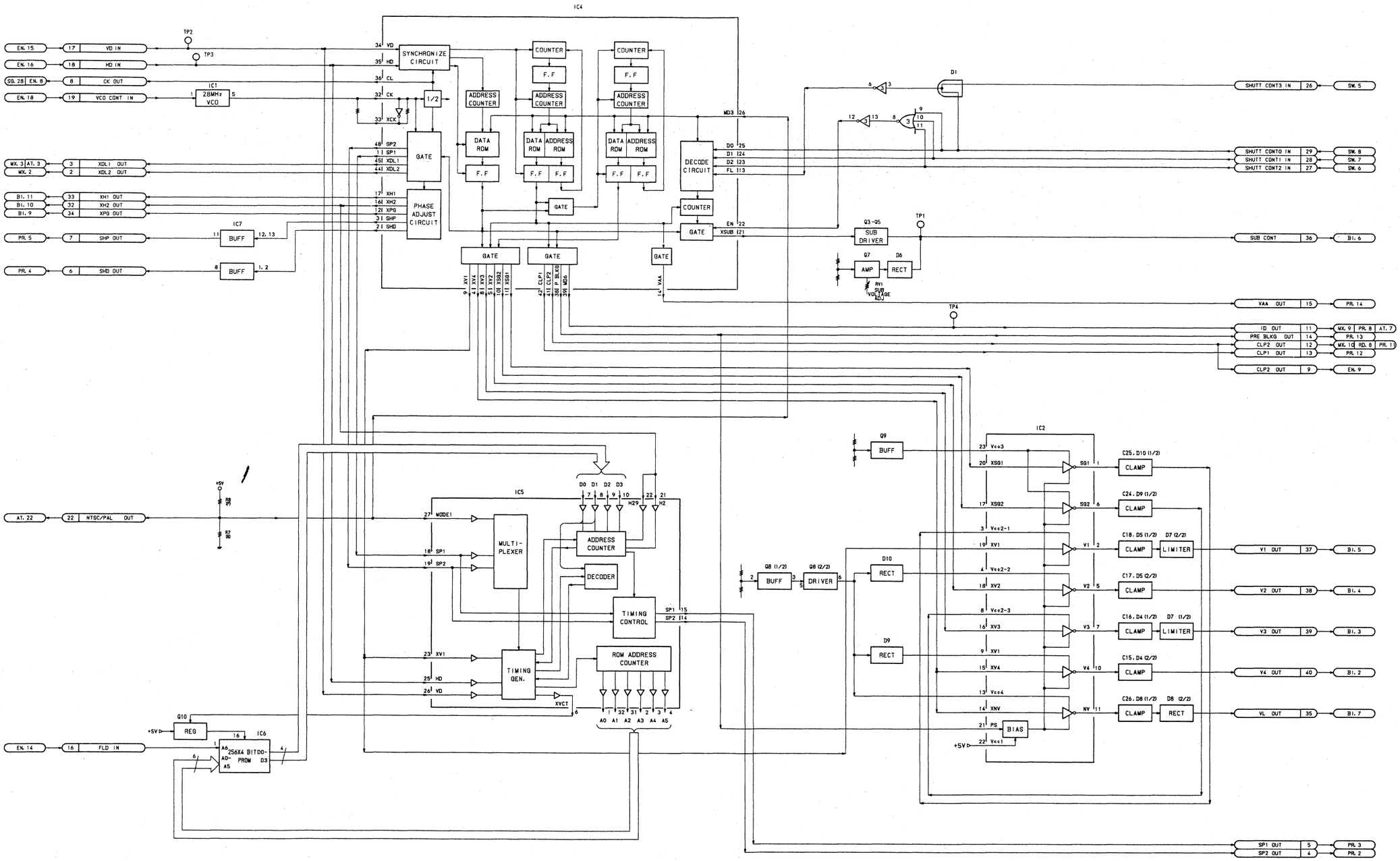
5

A-5

A-6

A B C D E F G H

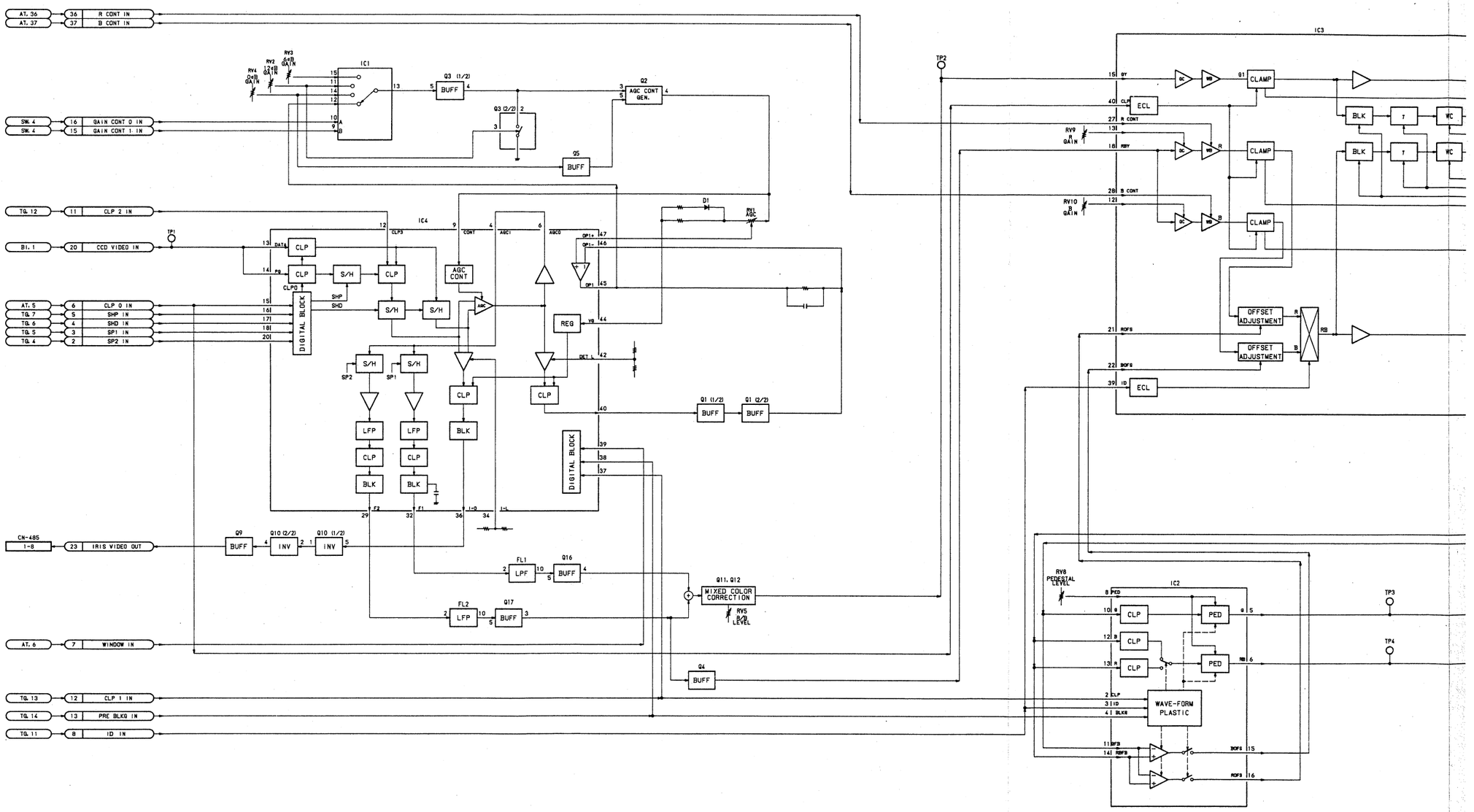
TG-83/83P BLOCK

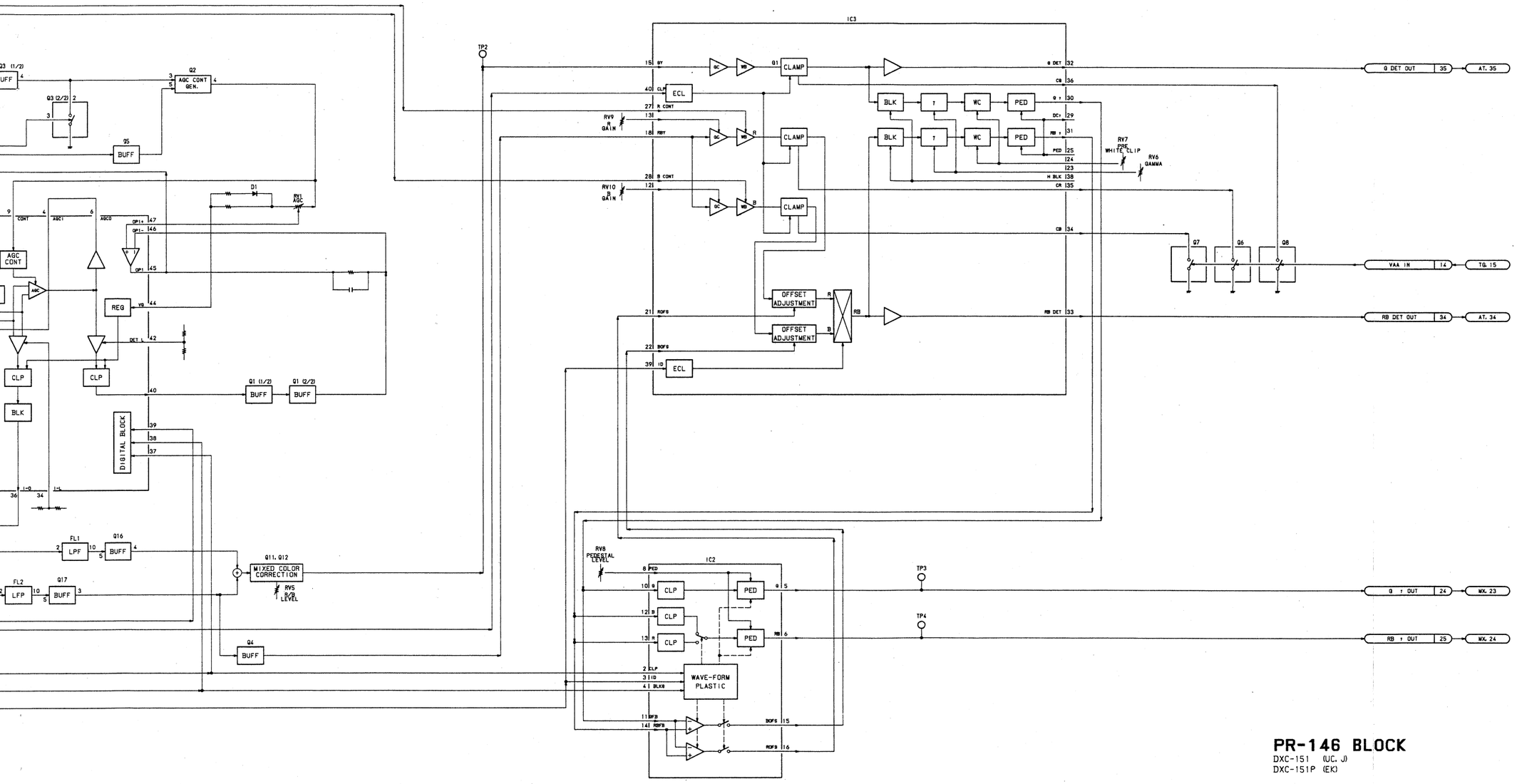


TG-83/83P BLOCK

DXC-151 (UC,J)
DXC-151P (EK)

PR-146 BLOCK

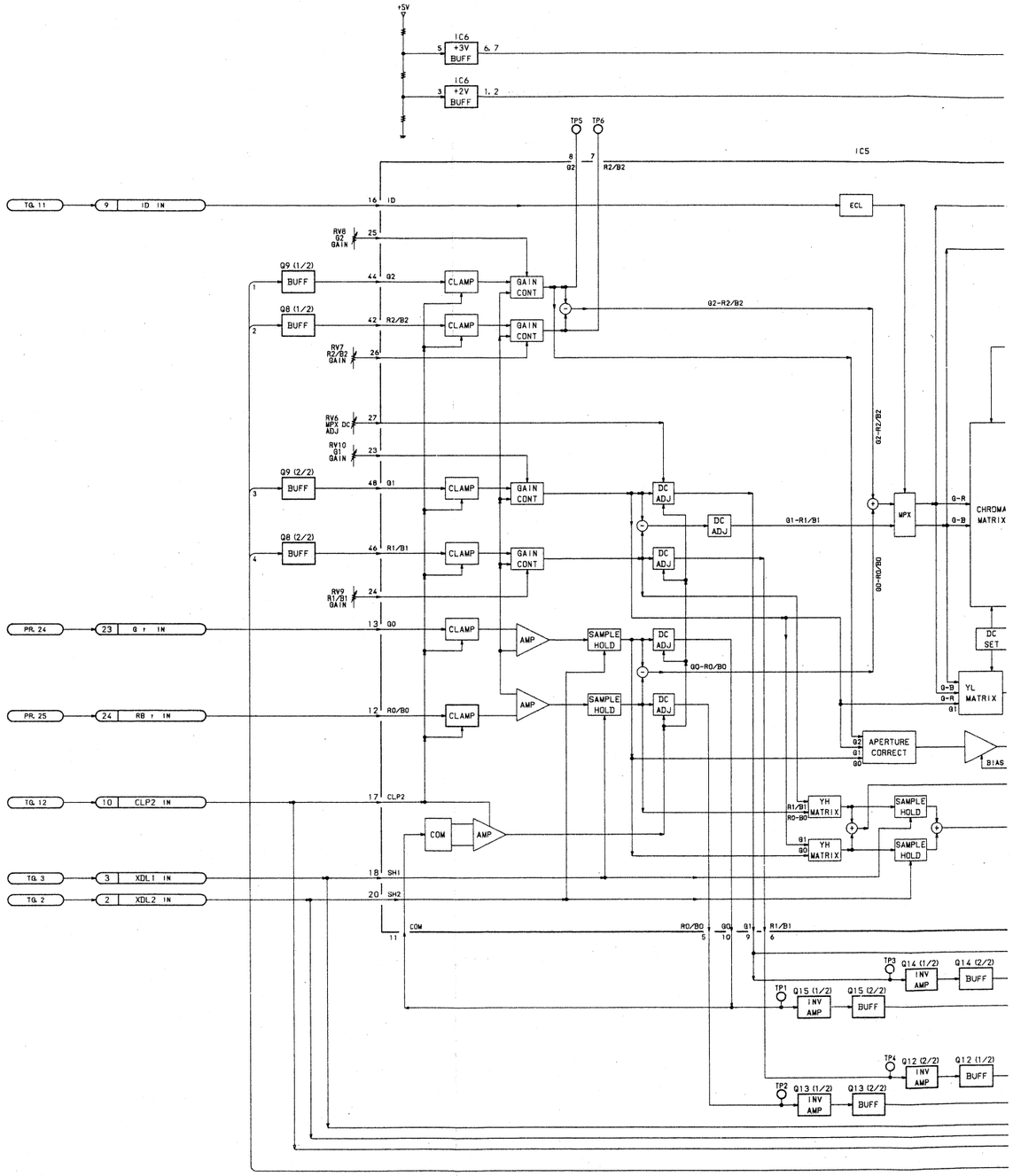

AT. 36
AT. 37
36 R CONT IN
37 B CONT IN
SW. 4
SW. 4
16 GAIN CONT 0 IN
15 GAIN CONT 1 IN
TG. 12
11 CLP 2 IN
BI. 1
20 CCD VIDEO IN
AT. 5
TG. 7
TG. 6
TG. 5
TG. 4
6 CLP 0 IN
5 SHP IN
4 SHD IN
3 SP1 IN
2 SP2 IN
TG. 13
TG. 14
TG. 11
12 CLP 1 IN
13 PRE BLKG IN
8 ID IN
AT. 6
7 WINDOW IN
CN-485
1-8
23 IRIS VIDEO OUT
RV1 AGC
RV2 12dB GAIN
RV3 6dB GAIN
RV4 0dB GAIN
RV5 BVD LEVEL
RV8 PEDESTAL LEVEL
RV9 R GAIN
RV10 B GAIN
IC1
IC2
IC3
IC4
Q1 (1/2) BUFF
Q1 (2/2) BUFF
Q2 AGC CONT GEN.
Q3 (1/2) BUFF
Q3 (2/2)
Q4 BUFF
Q5 BUFF
Q9 BUFF
Q10 (2/2) INV
Q10 (1/2) INV
Q11, Q12 MIXED COLOR CORRECTION
Q16 BUFF
Q17 BUFF
FL1 LPF
FL2 LPF
D1
TP1
TP2
TP3
TP4
CLP
S/H
AGC CONT
AGC
REG
LFP
BLK
DIGITAL BLOCK
ECL
CLAMP
OFFSET ADJUSTMENT
PED
WAVE-FORM PLASTIC



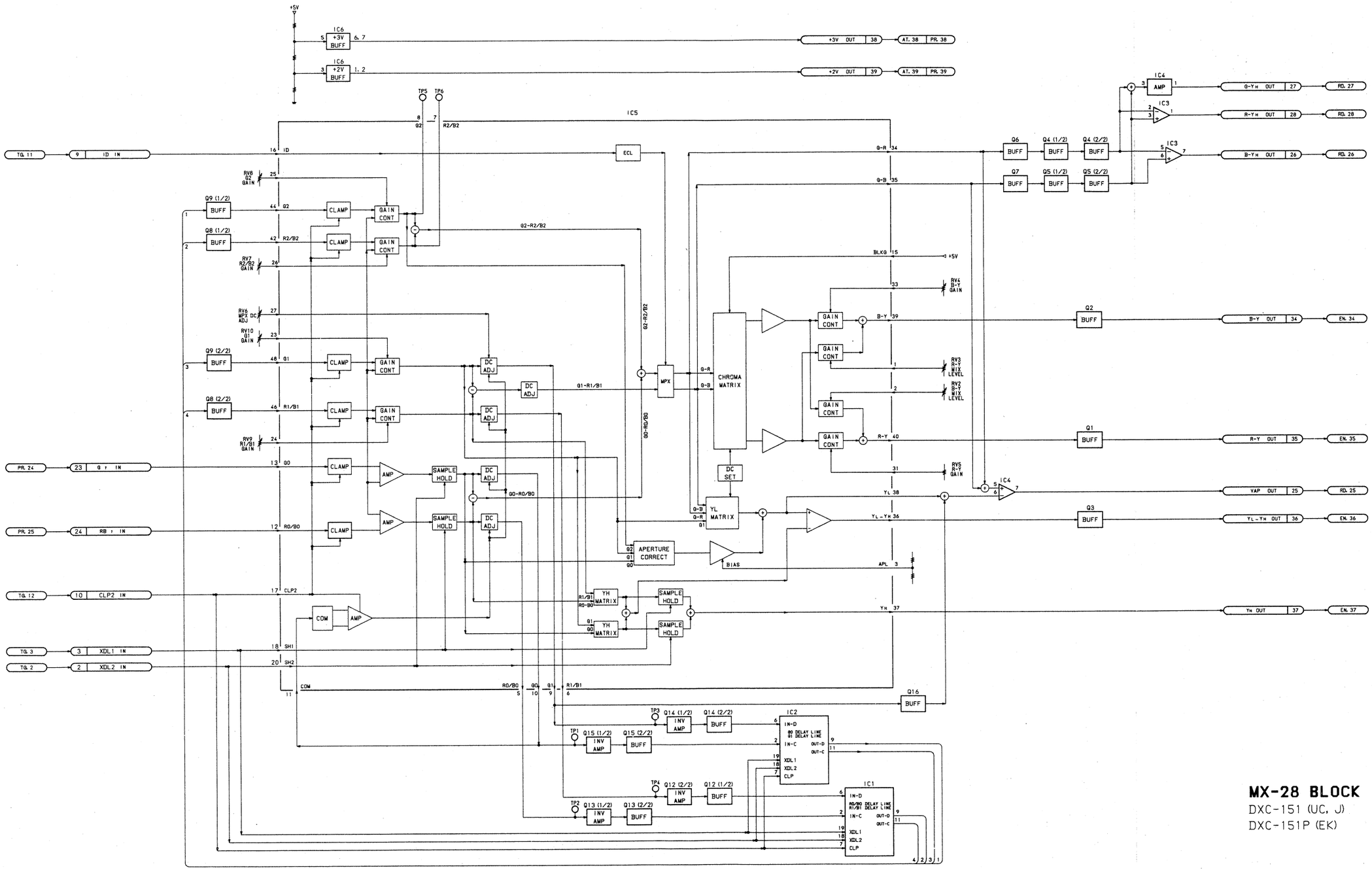
PR-146 BLOCK

DXC-151 (UC, J)
DXC-151P (EK)

MX-28 BLOCK

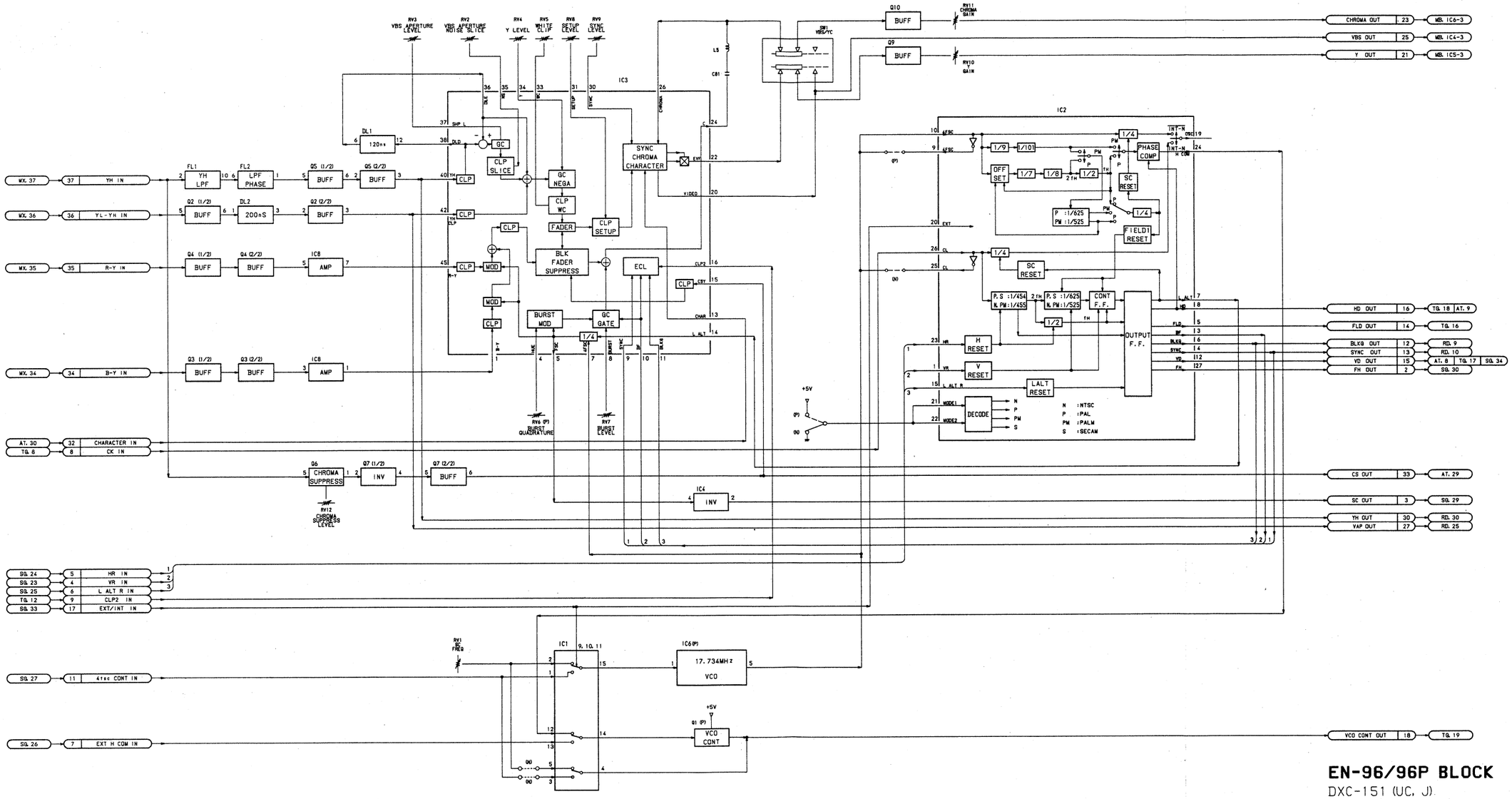

+5V
IC6 +3V BUFF
IC6 +2V BUFF
TP5 TP6
IC5
TG 11
9 ID IN
16 ID
ECL
RV8 G2 GAIN
Q9 (1/2) BUFF
44 Q2
CLAMP
GAIN CONT
Q8 (1/2) BUFF
42 R2/B2
RV7 R2/B2 GAIN
26
RV6 MPX DC ADJ
27
RV10 G1 GAIN
23
Q9 (2/2) BUFF
48 Q1
Q8 (2/2) BUFF
46 R1/B1
RV9 R1/B1 GAIN
24
PR 24
23 G 1 IN
13 Q0
AMP
SAMPLE HOLD
DC ADJ
PR 25
24 RB 1 IN
12 R0/B0
TG 12
10 CLP2 IN
17 CLP2
COM
TG 3
3 XDL1 IN
18 SH1
TG 2
2 XDL2 IN
20 SH2
11
5
10
9
6
G2-R2/B2
G1-R1/B1
G0-R0/B0
MPX
G-R
G-B
CHROMA MATRIX
DC SET
YL MATRIX
APERTURE CORRECT
BIAS
YH MATRIX
TP3 Q14 (1/2) INV AMP
Q14 (2/2) BUFF
TP1 Q15 (1/2) INV AMP
Q15 (2/2) BUFF
TP4 Q12 (2/2) INV AMP
Q12 (1/2) BUFF
TP2 Q13 (1/2) INV AMP
Q13 (2/2) BUFF

MX-28 BLOCK



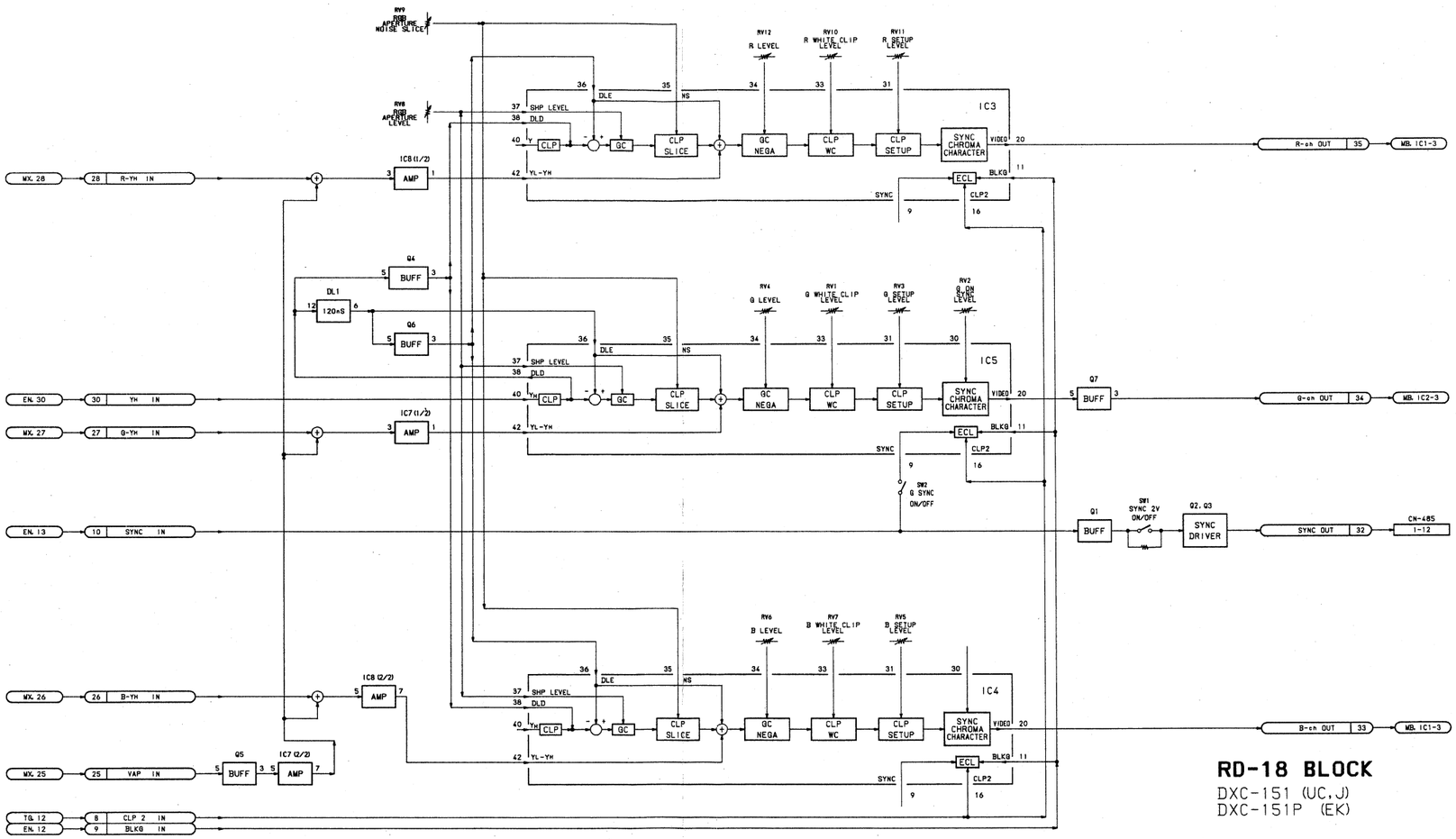
MX-28 BLOCK
DXC-151 (UC, J)
DXC-151P (EK)

EN-96/96P BLOCK



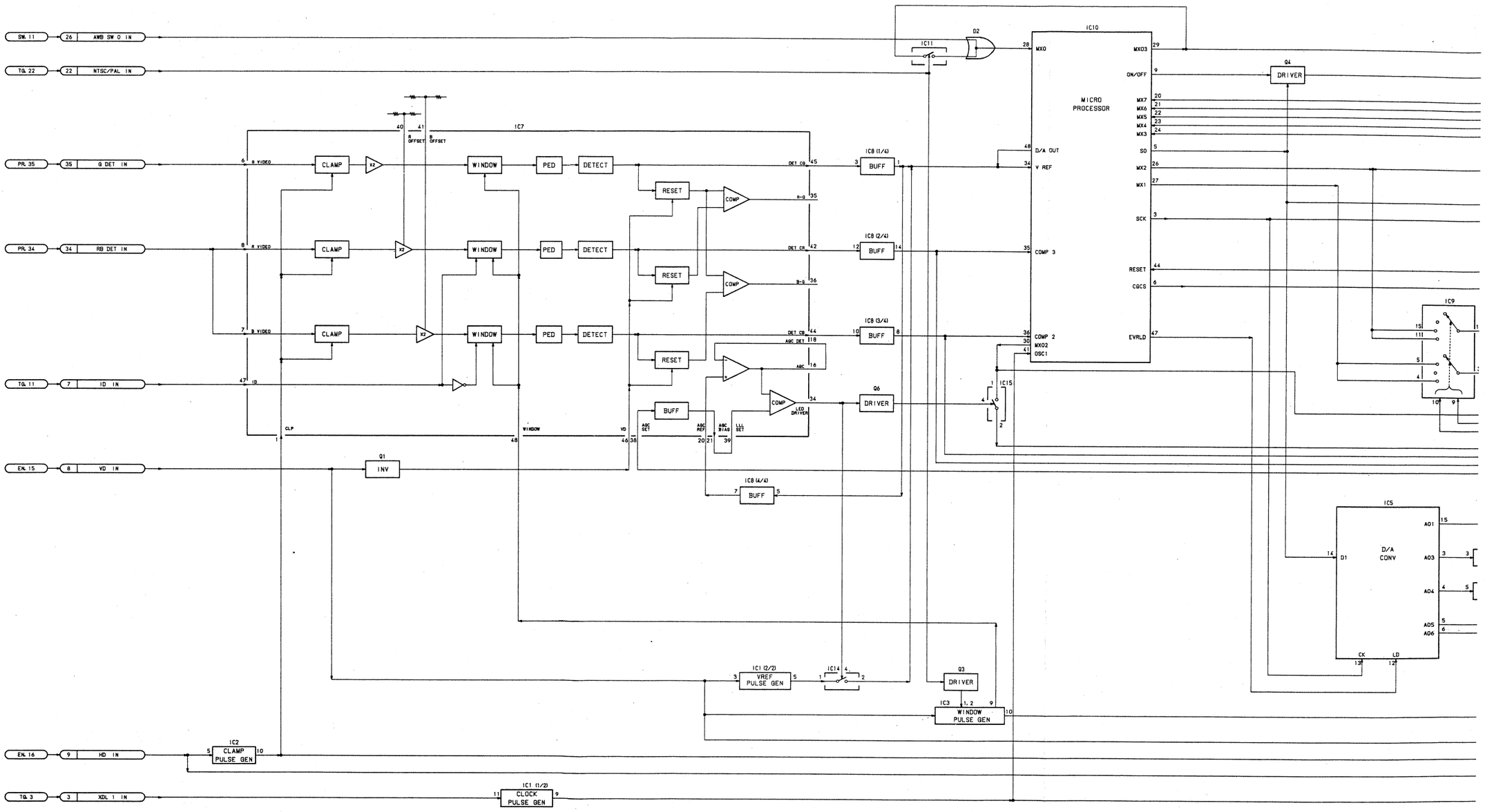
EN-96/96P BLOCK
DXC-151 (UC, J)
DXC-151P (EK)

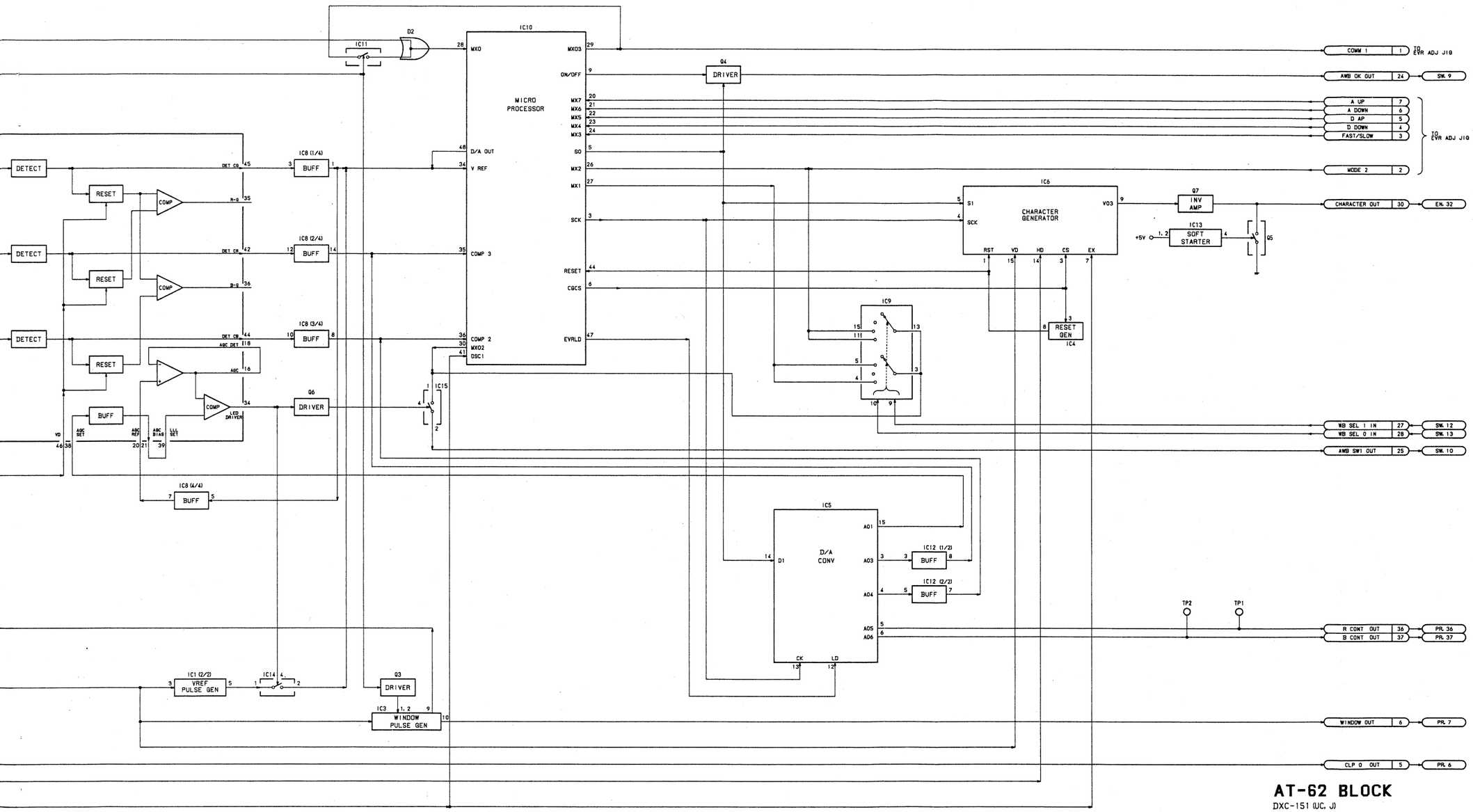
RD-18 BLOCK



RD-18 BLOCK
DXC-151 (UC, J)
DXC-151P (EK)

AT-62 BLOCK


SW. 11
26
AWB SW D IN
TG. 22
22
NTSC/PAL IN
PR. 35
35
G DET IN
PR. 34
34
RB DET IN
TG. 11
7
ID IN
EN. 15
8
VD IN
EN. 16
9
HD IN
TG. 3
3
XDL 1 IN
CLAMP
X2
WINDOW
PED
DETECT
RESET
COMP
BUFF
INV
IC7
IC8 (1/4)
IC8 (2/4)
IC8 (3/4)
IC8 (4/4)
Q1
Q3
Q4
Q6
DRIVER
IC10
MICRO PROCESSOR
IC9
IC15
IC5
D/A CONV
IC2
CLAMP PULSE GEN
IC1 (1/2)
CLOCK PULSE GEN
IC1 (2/2)
VREF PULSE GEN
IC14
IC3
WINDOW PULSE GEN
D2
IC11
R OFFSET
B OFFSET
R VIDEO
B VIDEO
R-G
B-G
DET CR
DET CB
AGC DET
AGC
LED DRIVER
AGC SET
AGC REF
AGC BIAS
LLL SET
CLP
WINDOW
VD
D/A OUT
V REF
COMP 3
COMP 2
MX02
OSC1
ON/OFF
MX7
MX6
MX5
MX4
MX3
SO
MX2
MX1
SCK
RESET
CSCS
EVRLD
MX03
AO1
AO3
AO4
AO5
AO6
D1
CK
LD

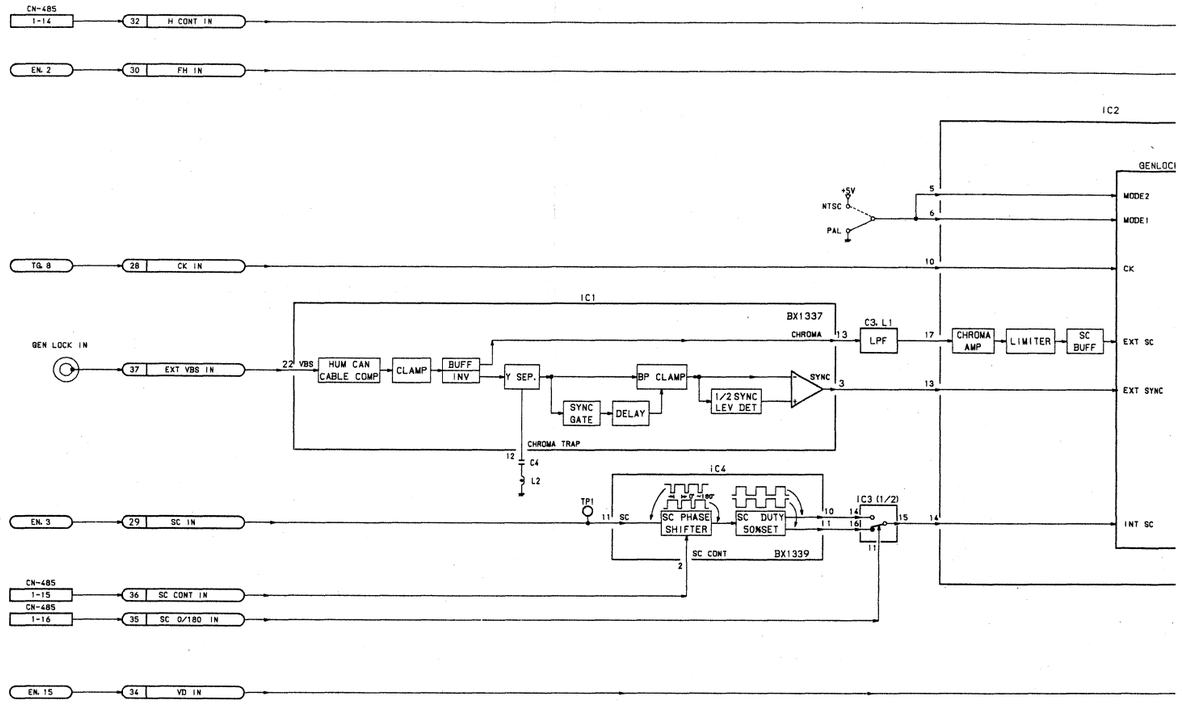


AT-62 BLOCK

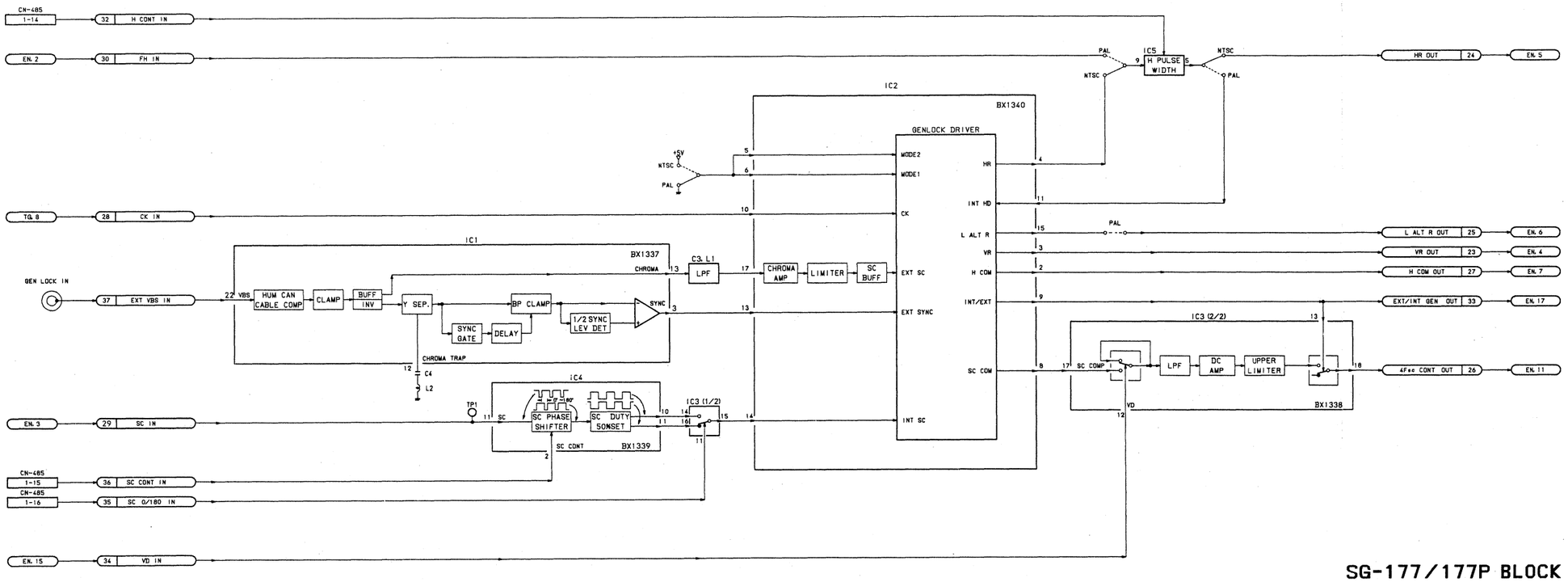
DXC-151 (UC, J)
DXC-151P (EK)

SG-177/177P

SG-177/177P BLOCK



SG-177/177P BLOCK

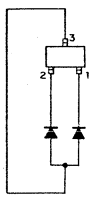


SG-177/177P BLOCK
DXC-151 (UC, J)
DXC-151P (EK)

SECTION B
SEMICONDUCTOR

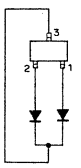
The circuit diagram of IC is obtained from the IC data book published by the manufacturer.

(SCALE 4/1)
TOP VIEW



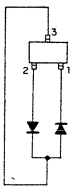
1S2835
1S2836

(SCALE 4/1)
TOP VIEW



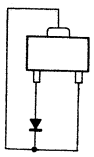
1S2837
MA152WK

(SCALE 4/1)
TOP VIEW



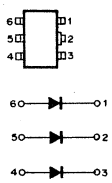
1SS123
1SS226

TOP VIEW (SCALE 4/1)



E10QS03
E10QS04

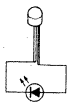
(SCALE 6/1)
TOP VIEW



MA121

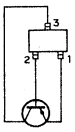
(SCALE 4/1)
TOP VIEW

RD ? ?M



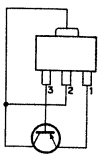
TLG102A ; GREEN

(SCALE 4/1)
TOP VIEW



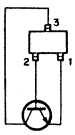
2SA1162G
2SA1162Y
2SA1462

(SCALE 4/1)
TOP VIEW



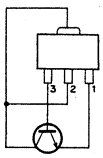
2SB804

(SCALE 4/1)
TOP VIEW



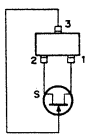
2SC2712G
2SC2712Y
2SC2757
2SC3735

TOP VIEW (SCALE 4/1)



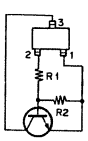
2SD1005

TOP VIEW (SCALE 4/1)



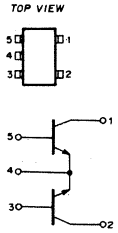
2SK94

TOP VIEW (SCALE 4/1)



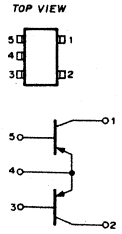
DTC114EK (R1 = 10K, R2 = 10K)

(SCALE 6/1)
TOP VIEW



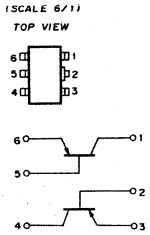
XN1216
XN1501

(SCALE 6/1)
TOP VIEW



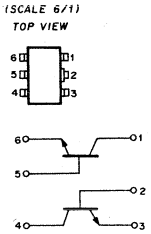
XN1401

(SCALE 6/1)
TOP VIEW



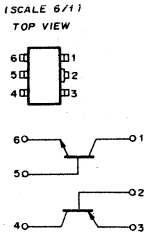
XN4401

(SCALE 6/1)
TOP VIEW



XN4501

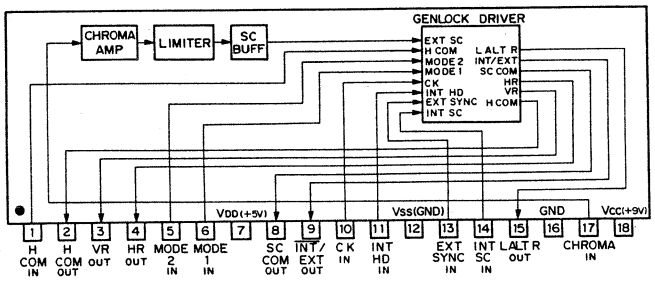
(SCALE 6/1)
TOP VIEW



XN4601

BX1340 (SONY)

SC LIMITER AND GENLOCK DRIVER
– REAR VIEW –



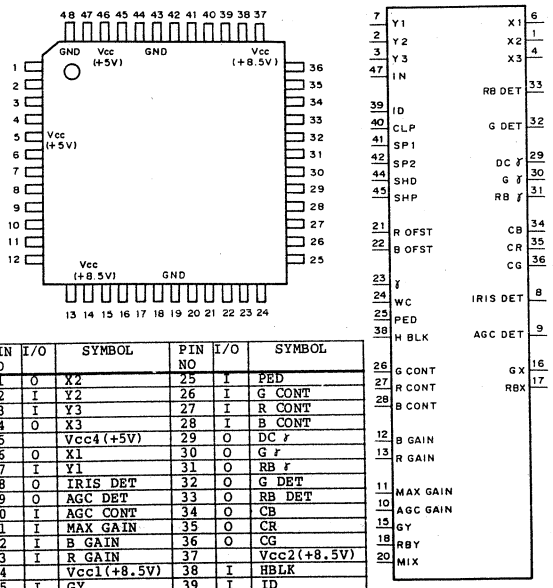
MODE SELECTION

MODE 1	MODE 2	MODE
1	1	NTSC
0	0	PAL

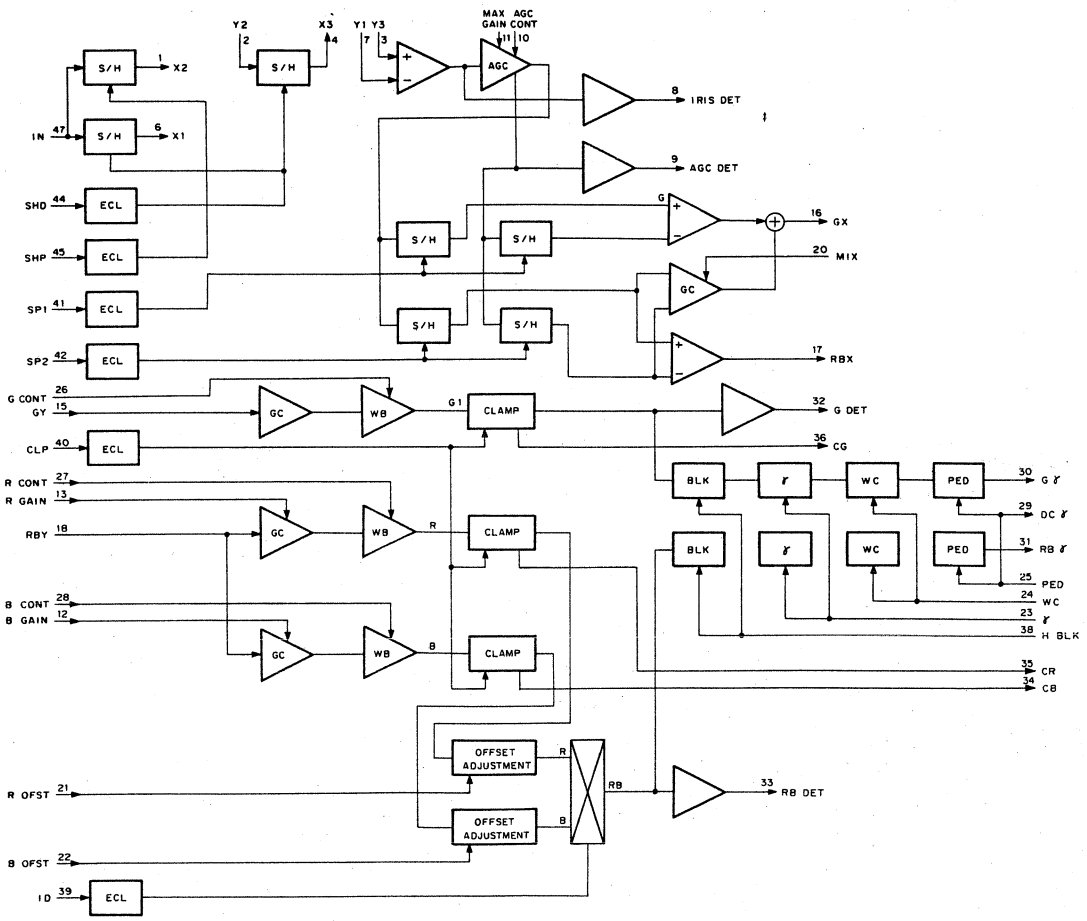
0 ; LOW LEVEL
1 ; HIGH LEVEL

CX20053 (SONY)

SIGNAL PROCESSING FOR COLOR CAMERA
– TOP VIEW –

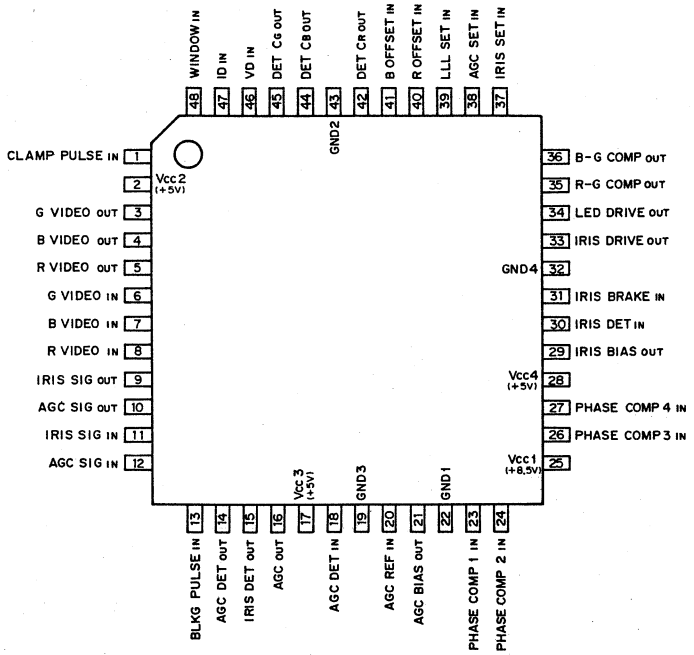


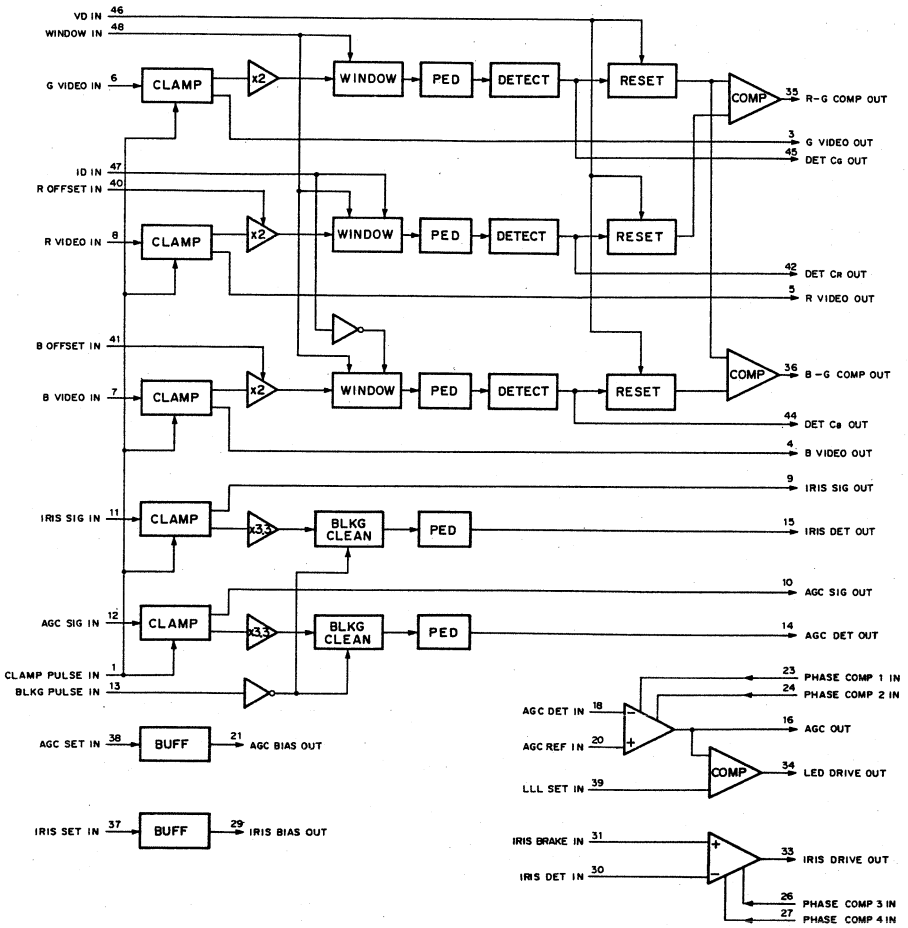
PIN NO	I/O	SYMBOL	PIN NO	I/O	SYMBOL
1	O	X2	25	I	PED
2	I	Y2	26	I	G CONT
3	I	Y3	27	I	R CONT
4	O	X3	28	I	B CONT
5		Vcc4(+5V)	29	O	DC γ
6	O	X1	30	O	G γ
7	I	Y1	31	O	RB γ
8	O	IRIS DET	32	O	G DET
9	O	AGC DET	33	O	RB DET
10	I	AGC CONT	34	O	CB
11	I	MAX GAIN	35	O	CR
12	I	B GAIN	36	O	CG
13	I	R GAIN	37		Vcc2(+8.5V)
14		Vcc1(+8.5V)	38	I	HBLK
15	I	GY	39	I	ID
16	O	GX	40	I	CLP
17	O	RBX	41	I	SP1
18	I	RBY	42	I	SP2
19		GND2	43	I	GND3
20	I	MIX	44	I	SHD
21	I	ROFST	45	I	SHP
22	I	BOFST	46		Vcc3(+5V)
23	I	γ	47	I	IN
24	I	WC	48		GND1



CX20056 (SONY)

AUTO IRIS, AUTO WHITE BALANCE AND AGC CONTROL FOR COLOR CAMERA
– TOP VIEW –

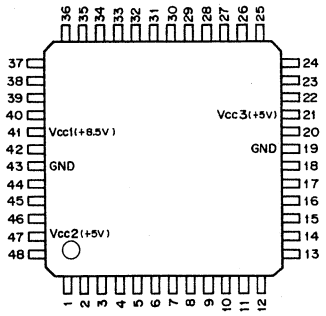


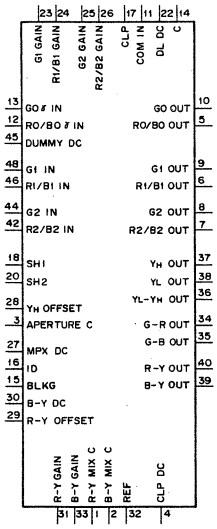


CX20151 (SONY) FLAT PACKAGE

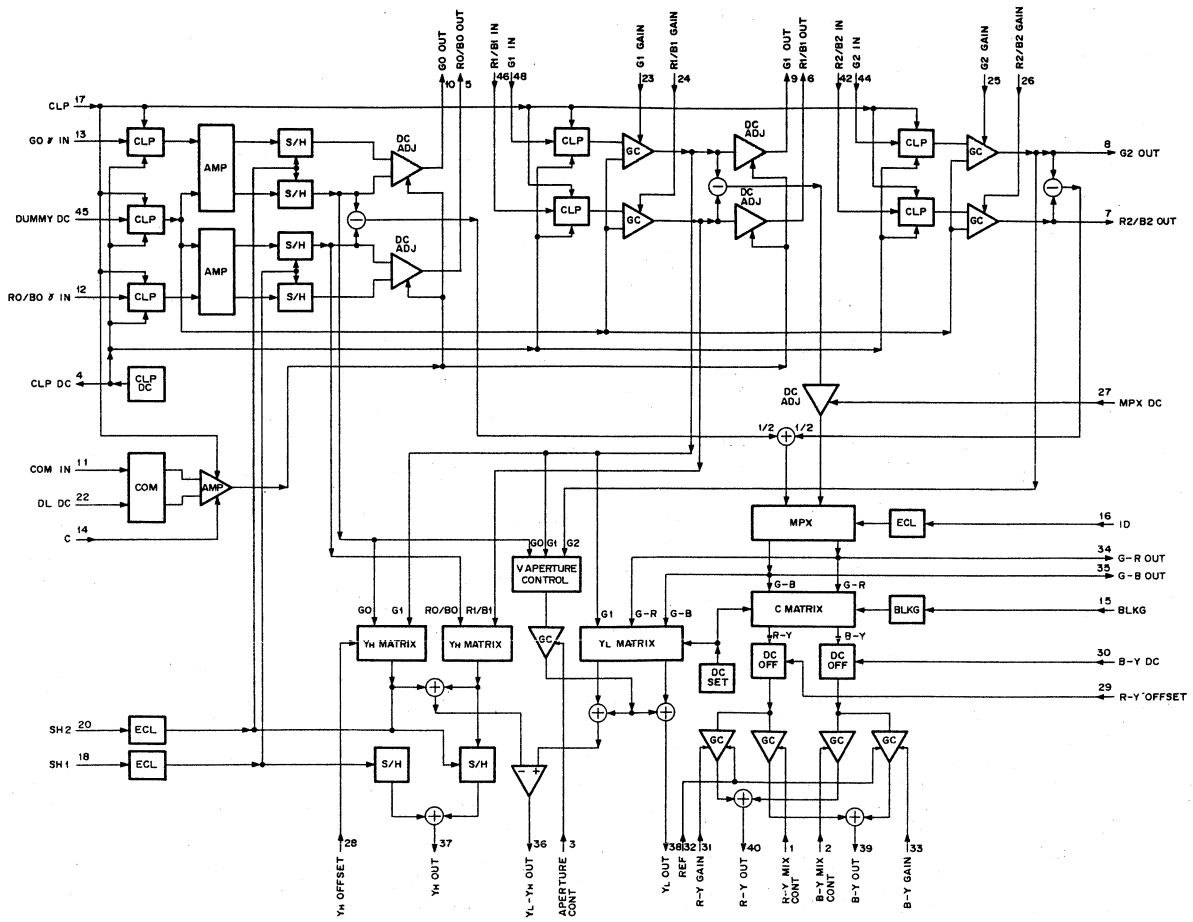
MATRIX FOR COLOR CAMERA

– TOP VIEW –



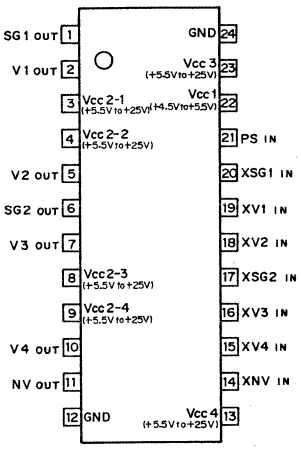


PIN No.	I/O	SIGNAL	PIN No.	I/O	SIGNAL
1	I	R-Y MIX CONT	25	I	G2 GAIN
2	I	B-Y MIX CONT	26	I	R2/B2 GAIN
3	I	APERTURE CONT	27	I	MPX DC
4	O	CLP DC	28	I	YH OFFSET
5	O	RO/BO	29	I	R-Y OFFSET
6	O	R1/B1	30	I	B-Y DC
7	O	R2/B2	31	I	R-Y GAIN
8	O	G2	32	I	REF
9	O	G1	33	I	B-Y GAIN
10	O	G0	34	O	G-R
11	I	COM	35	O	G-B
12	I	RO/BO γ	36	O	YL-YH
13	I	G0 γ	37	O	YH
14	I	C	38	O	YL
15	I	BLKG	39	O	B-Y
16	I	ID	40	O	R-Y
17	I	CLP	41	—	Vcc1 (+8.5V)
18	I	SH1	42	I	R2/B2
19	—	GND	43	—	GND
20	I	SH2	44	I	G2
21	—	Vcc3 (+5V)	45	I	DUMMY DC
22	I	DL DC	46	I	R1/B1
23	I	G1 GAIN	47	—	Vcc2 (+5V)
24	I	R1/B1 GAIN	48	I	G1

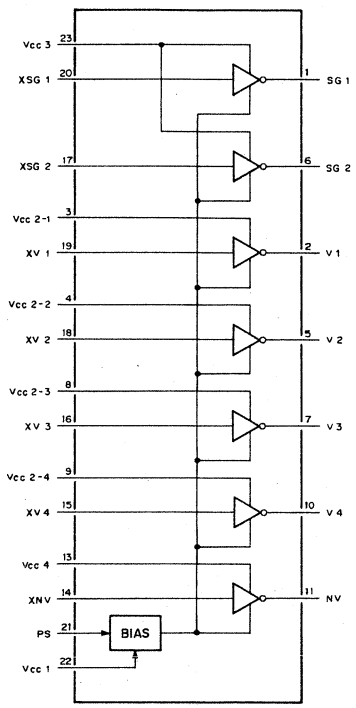


CXA1065M (SONY) FLAT PACKAGE

INVERTING DRIVER FOR CCD CLOCK WITH POWER SAVE
– TOP VIEW –

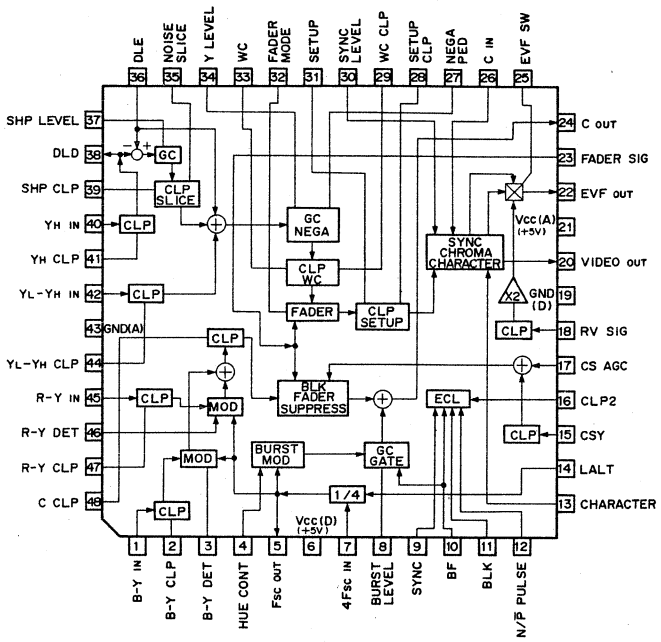


XV1–XV4 ; VERTICAL REGISTER TRANSMISSION CLOCK INPUT
V1 – V4 ; VERTICAL REGISTER TRANSMISSION CLOCK OUTPUT
XSG1, XSG2 ; SENSOR GATE PULSE INPUT
SG1, SG2 ; SENSOR GATE PULSE OUTPUT
XNV ; DRIVER INPUT
NV ; DRIVER OUTPUT
PS ; POWER SAVE INPUT
Vcc 1 ; BIAS VOLTAGE
Vcc 2-1 ; V1 OUTPUT PULSE VOLTAGE
Vcc 2-2 ; V2 OUTPUT PULSE VOLTAGE
Vcc 2-3 ; V3 OUTPUT PULSE VOLTAGE
Vcc 2-4 ; V4 OUTPUT PULSE VOLTAGE
Vcc 3 ; SG1, SG2 OUTPUT PULSE VOLTAGE
Vcc 4 ; NV OUTPUT PULSE VOLTAGE



CXA1072R (SONY)

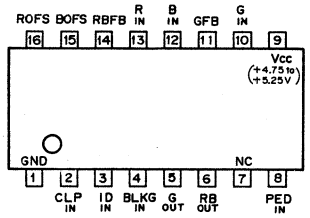
CCD CAMERA SIGNAL PROCESSOR
– TOP VIEW –

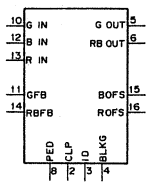


AGC : AUTOMATIC GAIN CONTROL
BF : BURST FLAG
BLK : BLANKING
C IN : CHROMA INPUT
CLP : CLAMP
CONT : CONTROL
CS : CHROMA SUPPRESS
DET : DETECTOR
DLD : DELAY LINE DRIVE
DLE : DELAY LINE END
EVF : ELECTRIC VIEW FINDER
GC : GAIN CONTROL
N/P : NEGA/POSI
LALT : LINE ALTERNATE
PED : PEDESTAL
RV : RETURN VIDEO
SHP : SHARPNESS
WC : WHITE CLIP

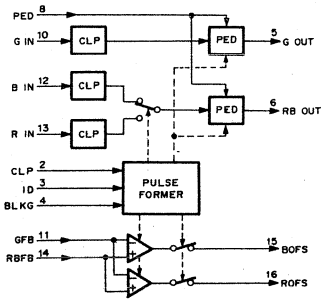
CXA1157M (SONY) FLAT PACKAGE

VIDEO SIGNAL SWITCH, BLANKING
– TOP VIEW –



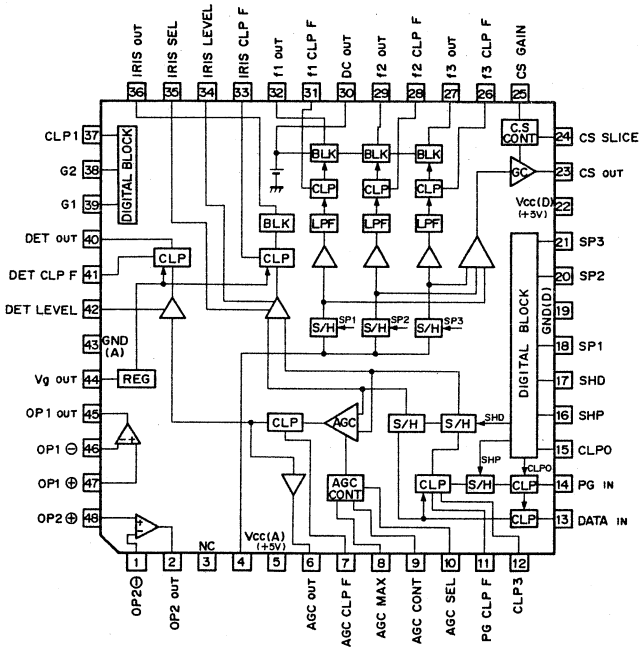


B IN ; B SIGNAL INPUT
BLKG IN ; BLANKING PULSE INPUT
BOFS ; COMPARISON (H) OUTPUT
CLP ; CLAMP PULSE INPUT
G IN ; G SIGNAL INPUT
GFB ; REFERENCE LEVEL INPUT
G OUT ; G SIGNAL OUTPUT
ID IN ; ID PULSE INPUT
PED IN ; PEDESTAL INPUT
ROFS ; COMPARISON (L) OUTPUT
R IN ; R SIGNAL INPUT
RB OUT ; R/B SIGNAL OUTPUT
RBFB ; COMPARISON SIGNAL INPUT



CXA1337R (SONY)

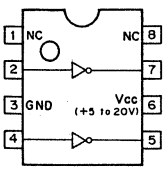
CCD CAMERA SIGNAL PROCESSOR
– TOP VIEW –



AGC	; AUTOMATIC GAIN CONTROL	G1	; BLK PULSE INPUT
BLK	; BLANKING	G2	; WINDOW PULSE INPUT
C IN	; CHROMA INPUT	GC	; GAIN CONTROL
CLP	; CLAMP	OP	; OPERATIONAL AMP.
CONT	; CONTROL	S/H	; SAMPLE HOLD
CS	; CHROMA SUPPRESS	SEL	; SELECT
DET	; DETECTOR	Vg	; REGULATOR OUTPUT

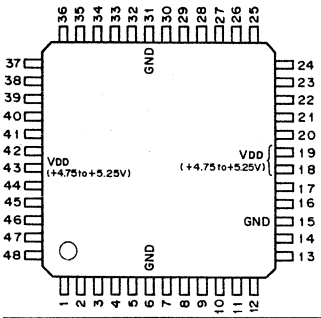
CXB0026AM (SONY) FLAT PACKAGE

DUAL INVERTING CLOCK DRIVER
– TOP VIEW –

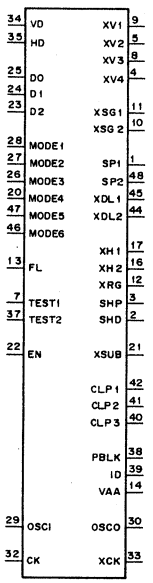


CXD1149R (SONY) FLAT PACKAGE

C-MOS SCANNING SYSTEM TIMING SIGNAL GENERATOR FOR CCD CAMERA
– TOP VIEW –



PIN NO.	I/O	SIGNAL	PIN NO.	I/O	SIGNAL	PIN NO.	I/O	SIGNAL	PIN NO.	I/O	SIGNAL
1	O	SP1	13	I	FL	25	I	D0	37	I	TEST2
2	O	SHD	14	O	VAA	26	I	MODE3	38	O	PBLK
3	O	SHP	15	–	GND	27	I	MODE2	39	O	ID
4	O	XV4	16	O	XH2	28	I	MODE1	40	O	CLP3
5	O	XV2	17	O	XH1	29	I	OSCI	41	O	CLP2
6	–	GND	18	–	VDD	30	O	OSCO	42	O	CLP1
7	I	TEST1	19	–	VDD	31	–	GND	43	–	VDD
8	O	XV3	20	I	MODE4	32	I	CK	44	O	XDL2
9	O	XV1	21	O	XSUB	33	O	XCK	45	O	XDL1
10	O	XSG2	22	I	EN	34	I	VD	46	I	MODE6
11	O	XSG1	23	I	D2	35	I	HD	47	I	MODE5
12	O	XRG	24	I	D1	36	O	CL	48	O	SP2

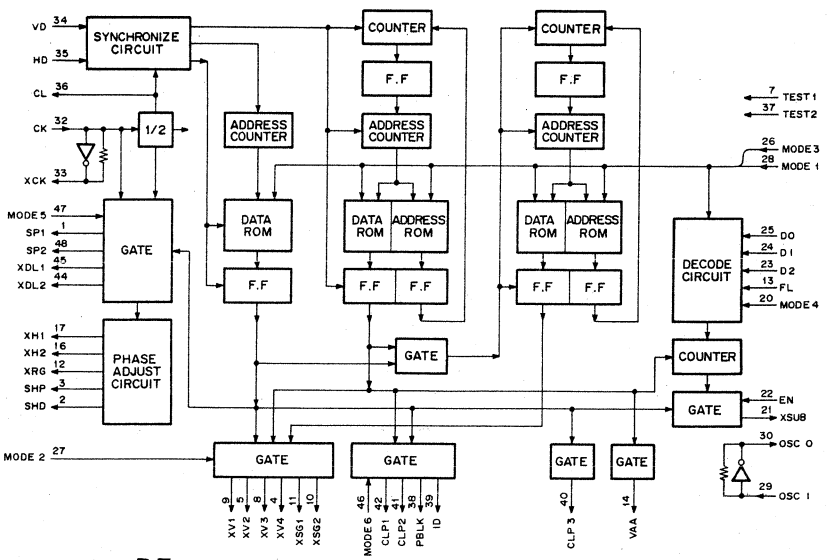


INPUT

CK	; INVERTER INPUT FOR DUTY CONTROL (MAIN CLOCK)
D0 – D2	; ELECTRONIC SHUTTER SPEED CHANGE
EN	; ELECTRONIC SHUTTER ON/OFF (0 ; OFF 1 ; ON)
FL	; ELECTRONIC SHUTTER FLICKER LESS
HD	; HORIZONTAL DRIVE PULSE
MODE1	; COLOR/MONOCHROME (B/W) CHANGE (0 ; COLOR 1 ; B/W)
MODE2	; FIELD/FRAME STORAGE CHANGE (0 ; FIELD 1 ; FRAME)
MODE3	; NTSC/PAL CHANGE (0 ; NTSC 1 ; PAL)
MODE4	; ELECTRONIC SHUTTER SPEED INPUT SELECT (0 ; SELIAL IN 1 ; PARALLEL IN)
MODE5	; COLOR/MONOCHROME (B/W) CHANGE (0 ; COLOR 1 ; B/W)
MODE6	; PBLK CONTROL PULSE (0 ; NARROW 1 ; WIDE)
OSCI	; INVERTER INPUT FOR OSCILLATOR
TEST1	; OPEN
TEST2	; GND
VD	; VERTICAL DRIVE SIGNAL

OUTPUT

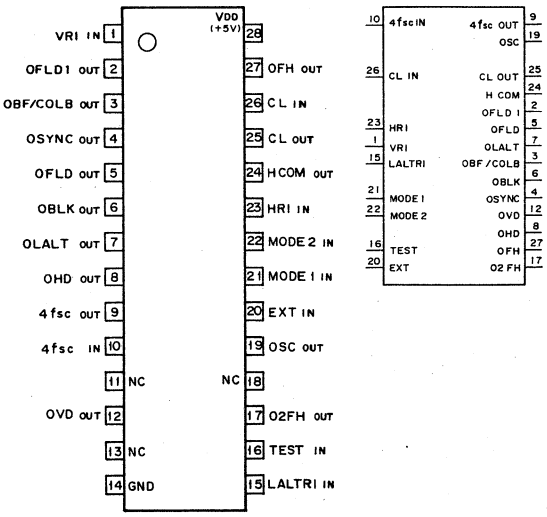
CL	; CLOCK OUTPUT FOR SYNC GENERATOR
CLP1 – CLP3	; CLAMP PULSE
ID	; LINE DISCRIMINATE PULSE
OSCO	; INVERTER OUTPUT FOR OSCILLATOR
PBLK	; PRE-BLANKING PULSE
SHD	; CCD DATA OUTPUT S/H PULSE
SHP	; CCD PRE CHARGE LEVEL S/H PULSE
SP1,SP2	; COLOR SEPARATE S/H PULSE
VAA	; VERTICAL BLANKING CLEANING PULSE
XCK	; INVERTER OUTPUT FOR DUTY CONTROL
XDL1 – XDL3	; CLOCK PULSE FOR DELAY LINE
XH1,XH2	; H REGISTER CLOCK PULSE
XRG	; CCD OUTPUT RESET PULSE
XSUB	; ELECTRIC CHARGE SWEEPING AWAY PULSE
XSG1,XSG2	; SENSOR ELECTRIC CHARGE READ OUT PULSE
XV1 – XV4	; V REGISTER CLOCK PULSE



CXD1217M (SONY) FLAT PACKAGE

C-MOS SYNC GENERATOR

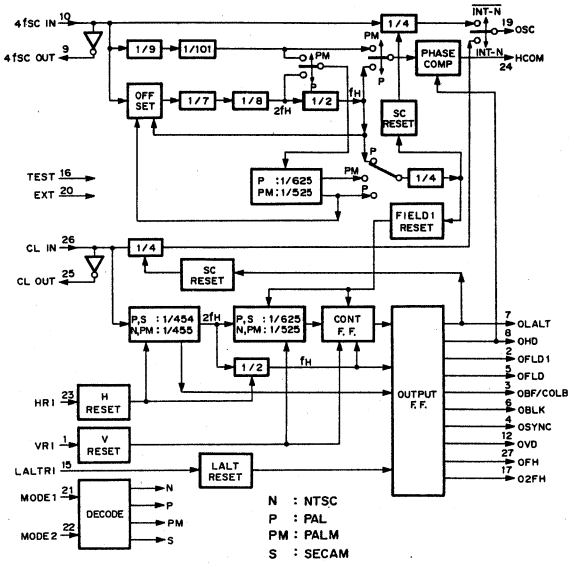
– TOP VIEW –



SYSTEM	4fsc	CLOCK
NTSC	910fH	910fH
PAL	1135fH+2fV	908fH
PALM	909fH	910fH
SECAM	—	908fH

INPUT		SYSTEM
MODE1	MODE2	
0	0	NTSC
0	1	SECAM
1	0	PALM
1	1	PAL

0 ; LOW LEVEL
1 ; HIGH LEVEL



N : NTSC
P : PAL
PM : PALM
S : SECAM

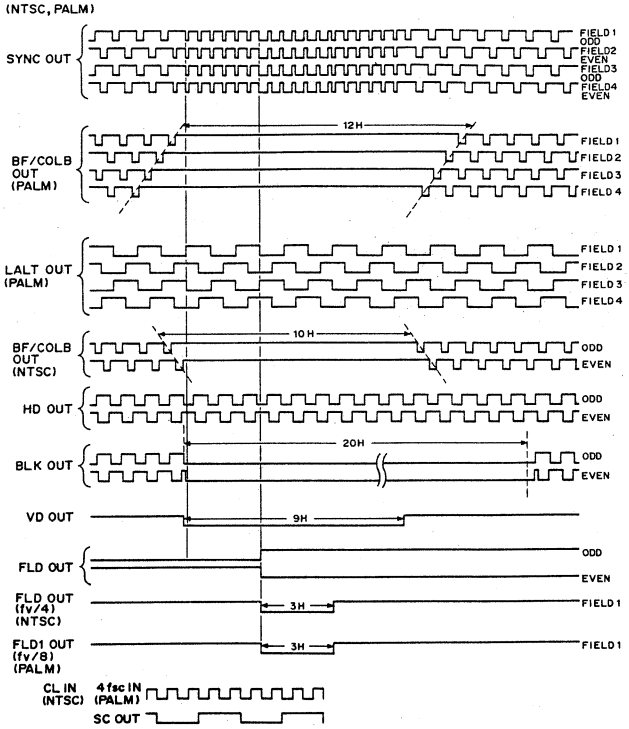
INPUT

4fSC IN ; 4fSC INPUT
CL IN ; CLOCK INPUT
EXT ; SYNC MODE SELECT
(L ; INTERNAL/H ; EXTERNAL)
HRI ; H RESET
LALTRI ; LINE CHANGE RESET
MODE 1,2 ; SYSTEM SELECT
VRI ; V RESET

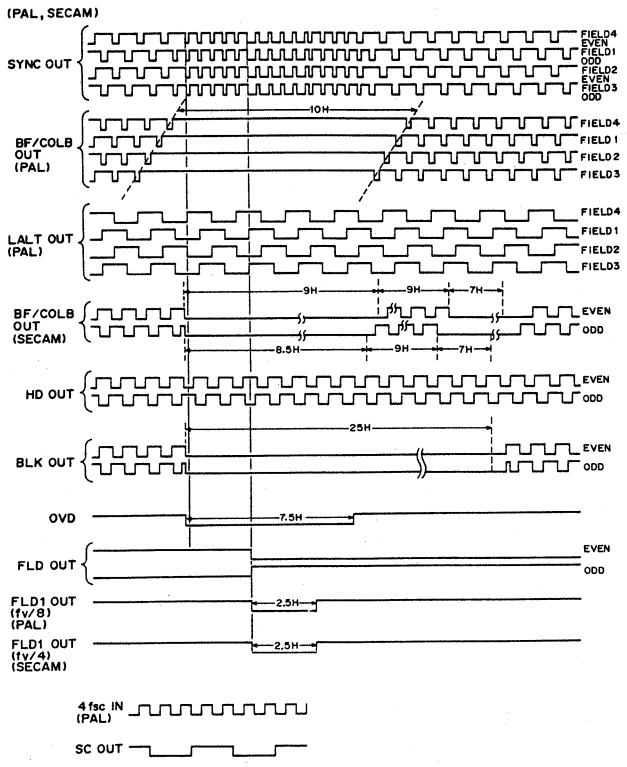
OUT PUT

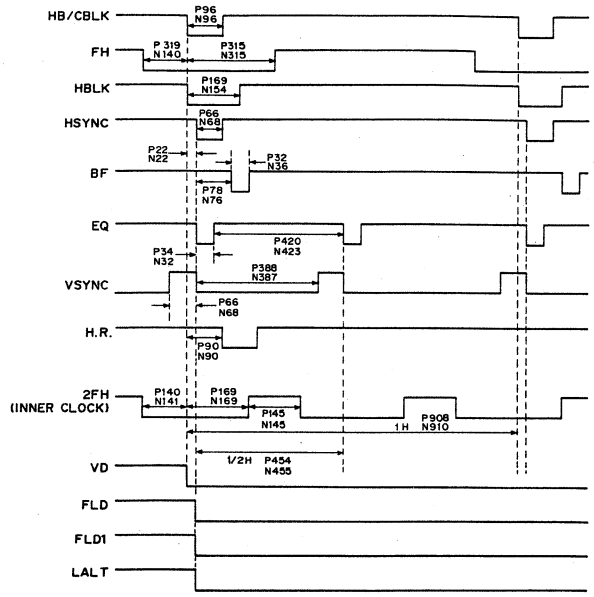
4fSC OUT ; 4fSC OUTPUT
CL OUT ; CLOCK OUTPUT
HCOM ; PHASE COMPARATOR
02fH ; 2fH OUTPUT
OBF/COLB ; BURST FLAG/COLOR BLANKING
OBLK ; COMPOSITE BLANKING
OFH ; H FREQUENCE
OFLD ; EVEN, ODD
OFLD1 ; FIELD1
OHD ; H DRIVE
OLALT ; LINE CHANGE
OSC ; SUBCARRIER
OSYNC ; COMPOSITE SYNC
OVD ; V DRIVE

(NTSC, PALM)

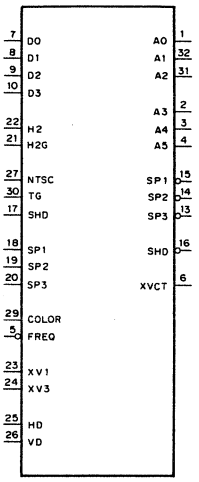


(PAL, SECAM)



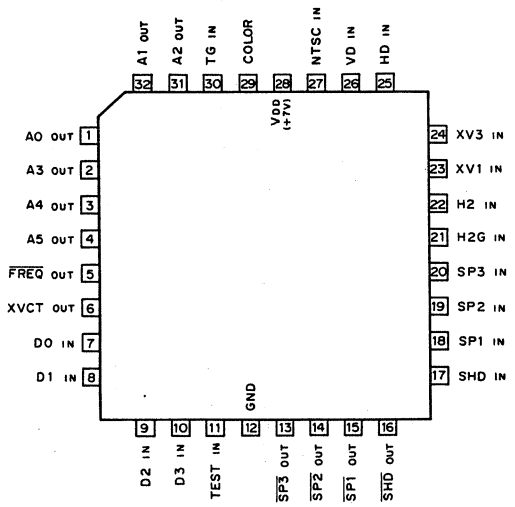


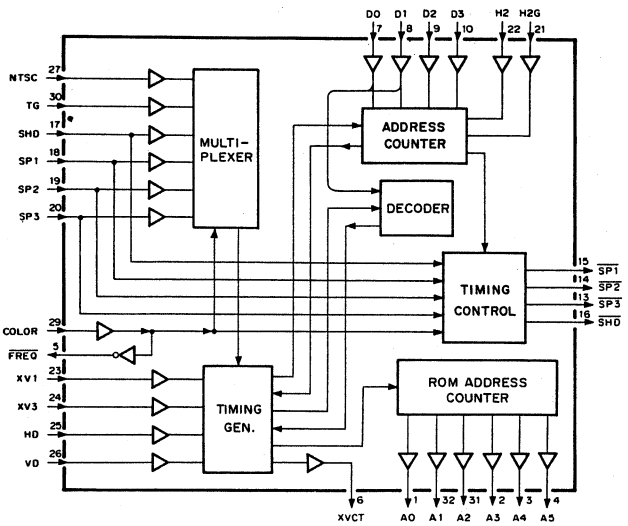
P: PAL, SECAM
N: NTSC, PALM



D1-D4 ; EXTERNAL ROM DATA INPUT
A0-A5 ; EXTERNAL ROM ADDRESS OUTPUT
$\overline{SP1}$-$\overline{SP3}$; SAMPLE HOLD PULSE
$\overline{SHD}$; DATA SAMPLE HOLD PULSE
H2,H2G ; CLOCK INPUT FOR HORIZONTAL REGISTER TRANSMISSION
XV1,XV3 ; CLOCK INPUT FOR VERTICAL REGISTER TRANSMISSION
XVCT ; POWER CONTROL OUTPUT FOR EXTERNAL ROM
HD ; HORIZONTAL DRIVE INPUT
VD ; VERTICAL DRIVE INPUT

CXD1251Q (SONY)
C-MOS TIMING CONTROLLER
– TOP VIEW –





MODE SELECTION

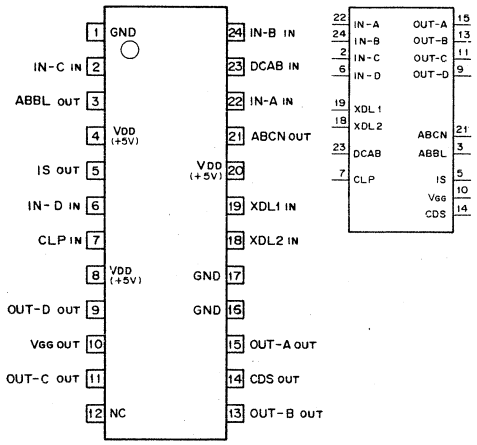
	1	0
NTSC	CCIR MODE	NTSC MODE
COLOR	B/W MODE	COLOR MODE
TG	IC FOR TG: CXD1149 USE	IC FOR TG: CXD1155/1156 USE

1 ; HIGH LEVEL
0 ; LOW LEVEL

CXL1505M (SONY) FLAT PACKAGE

C-MOS CCD SIGNAL PROCESSOR

– TOP VIEW –

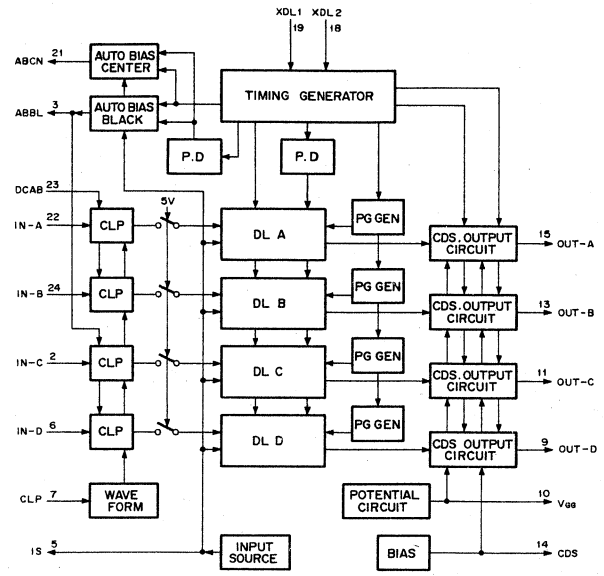


INPUT

CLP	; CLAMP PULSE
DCAB	; DC BIAS FOR A, B CH
IN-A, B, C, D	; SIGNAL INPUT A, B, C, D CH
XDL1, 2	; CLOCK PULSE IN1, 2

OUTPUT

ABBL	; AUTO BIAS DC OUT FOR Y SIGNAL
ABCN	; AUTO BIAS DC OUT FOR C SIGNAL
CDS	; DC OUT FOR CDS
IS	; INPUT SOURCE DC OUT
OUT-A, B, C, D	; SIGNAL OUTPUT A, B, C, D CH
VGG	; GATE BIAS DC OUT

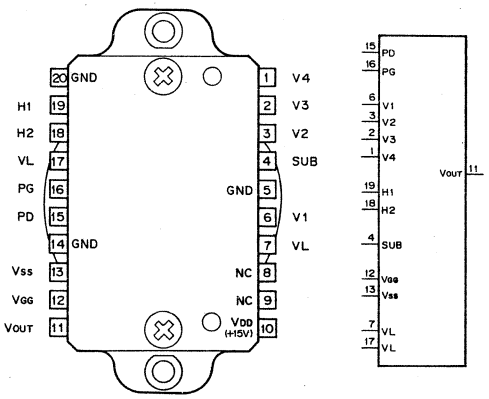


IU022AR (SONY) (NTSC)

IU024AR (SONY) (PAL)

CCD IMAGE BLOCK FOR COLOR CAMERA

– BOTTOM VIEW –

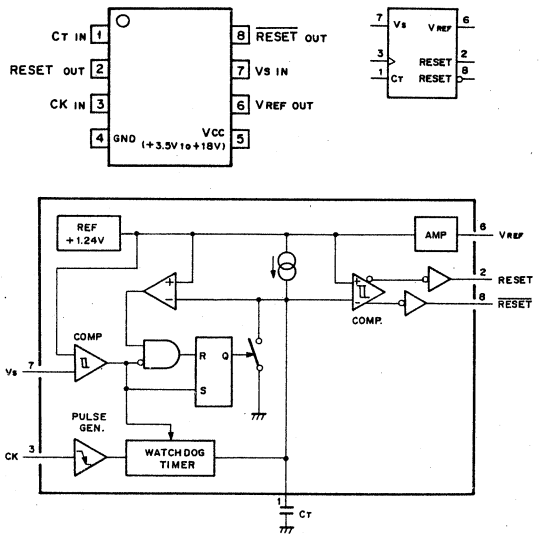


H1, H2	; TRANSFER CLOCK INPUTS OF HORIZONTAL SHIFT REGISTER
PD	; OUTPUT RESET CLOCK INPUT
PG	; PRECHARGE DRAIN BIAS INPUT
SUB	; SUBSTRATUM
V1 – V4	; TRANSFER CLOCK INPUTS OF VERTICAL SHIFT REGISTER
VGG	; GATE BIAS INPUT FOR OUTPUT AMP.
VL	; BIAS INPUT FOR LOOKOUT TRANSISTOR
VOUT	; SIGNAL OUTPUT
VSS	; SOURCE BIAS INPUT FOR OUTPUT AMP.

MB3773PF (FUJITSU) FLAT PACKAGE

BIPOLAR SOURCE VOLTAGE SUPERVISOR

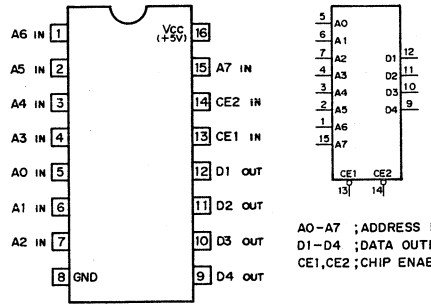
– TOP VIEW –



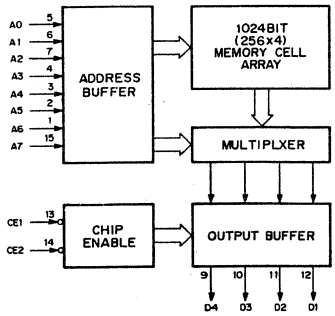
MB7114L (FUJITSU) (ACCESS TIME = 50nS)

TTL 1024-BIT (256x4) PROM

– TOP VIEW –



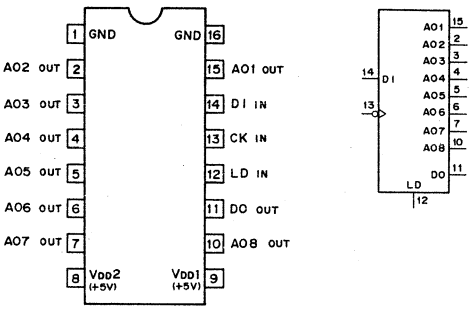
A0–A7 ;ADDRESS INPUTS
D1–D4 ;DATA OUTPUTS
CE1,CE2 ;CHIP ENABLE INPUTS



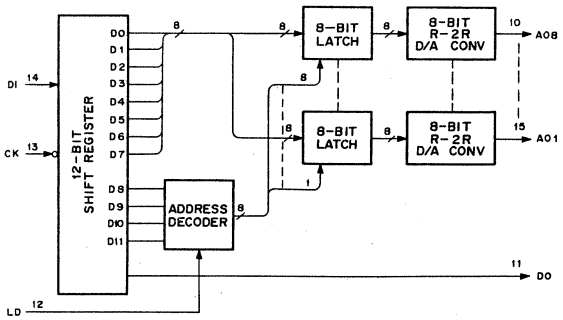
MB88342PF (FUJITSU) FLAT PACKAGE

C-MOS 8-BIT D/A CONVERTER

– TOP VIEW –



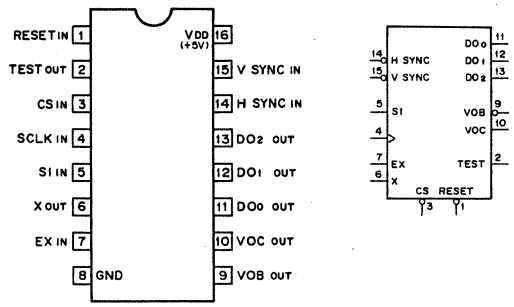
A01 – A08 : 8-BIT D/A OUTPUTS
CK : CLOCK INPUT
DI : SERIAL DATA INPUT
DO : DATA OUTPUT
LD : DATA LOAD CONTROL INPUT (H : LOAD)



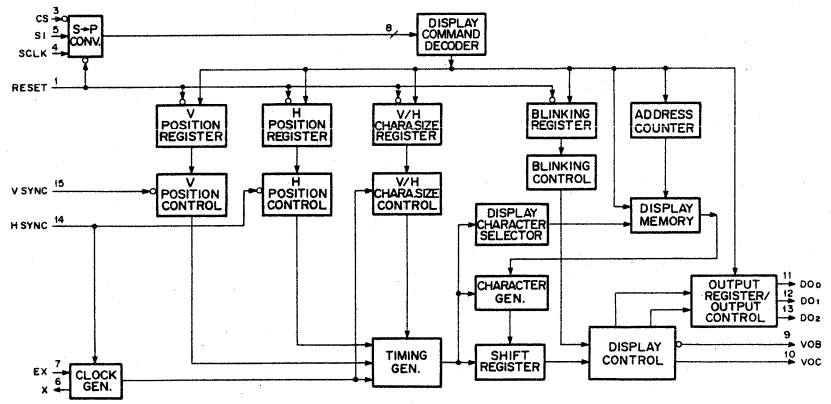
MB88313PF (FUJITSU) FLAT PACKAGE

C-MOS TV DISPLAY CONTROLLER

– TOP VIEW –



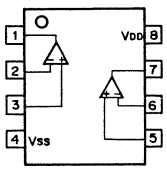
CS	; CHIP SELECT INPUT
DO0 – DO2	; DATA OUTPUT
EX	; DOT CLOCK INPUT
H SYNC	; H SYNC INPUT
RESET	; RESET INPUT
SCLK	; SHIFT CLOCK INPUT
SI	; SERIAL DATA INPUT
TEST	; CHIP TEST OUTPUT
VOB	; BLINKING SIGNAL OUTPUT
VOC	; CHARACTER SIGNAL OUTPUT
V SYNC	; V SYNC INPUT
X	; DOT CLOCK OUTPUT



MC14577AF (MOTOROLA)

DUAL VIDEO AMPLIFIER

– TOP VIEW –

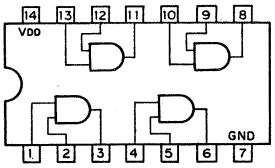


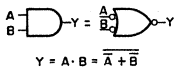
※VDD + | Vss | = +5V to +12V

MC74HC08AF (MOTOROLA) FLAT PACKAGE

C-MOS QUAD 2-INPUT AND GATE

– TOP VIEW –





$Y = A \cdot B = \overline{\overline{A} + \overline{B}}$

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

0; LOW LEVEL
1; HIGH LEVEL

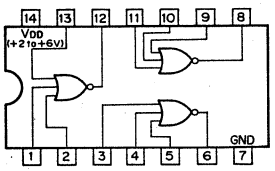
NOTE :

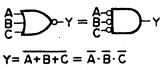
TYPE	VDD
TC74AC08F	+2 to +5.5V
OTHER TYPES	+2 to +6V

MC74HC27F (MOTOROLA) FLAT PACKAGE

C-MOS 3-LINE POSITIVE-NOR GATE

– TOP VIEW –





$Y = \overline{A+B+C} = \overline{A} \cdot \overline{B} \cdot \overline{C}$

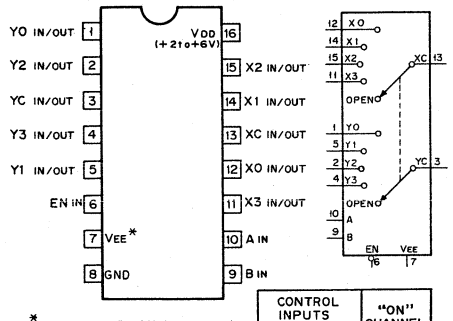
A	B	C	Y
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	0

0; LOW LEVEL
1; HIGH LEVEL

MC74HC4052F (MOTOROLA) FLAT PACKAGE

C-MOS DUAL 4-CHANNEL ANALOG MULTIPLEXER/DEMULTIPLEXER

– TOP VIEW –



※VEE ; VDD – VEE = +3 to +12V

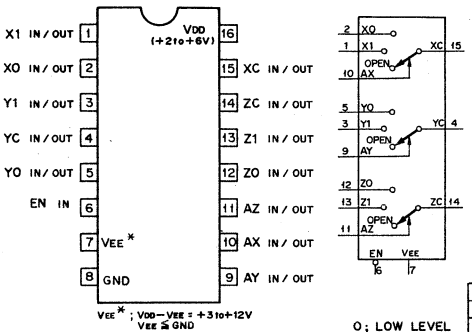
CONTROL INPUTS			"ON" CHANNEL
EN	B	A	
0	0	0	0
0	0	1	1
0	1	0	2
0	1	1	3
1	X	X	OPEN

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE.

MC74HC4053F (MOTOROLA) FLAT PACKAGE

C-MOS TRIPLE 2-CHANNEL ANALOG MULTIPLEXER/DEMULTIPLEXER

– TOP VIEW –



※VEE ; VDD – VEE = +3 to +12V
VEE ≦ GND

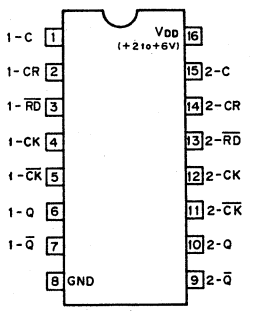
CONT. INPUTS		ON CHANNEL
EN	A (X,Y,Z)	
0	0	0
0	1	1
1	X	OPEN

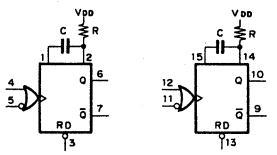
0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE.

MC74HC4538AF (MOTOROLA) FLAT PACKAGE

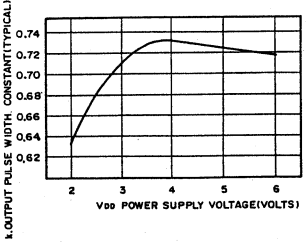
C - MOS DUAL RETRIGGERABLE / NON - RETRIGGERABLE MONOSTABLE MULTIVIBRATOR

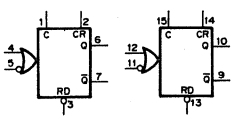
– TOP VIEW –



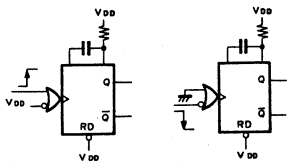


OUTPUT PULSE WIDTH = k·C·R

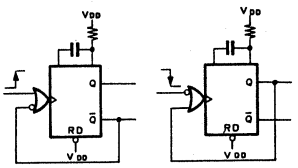




RETRIGGERABLE M.M.V



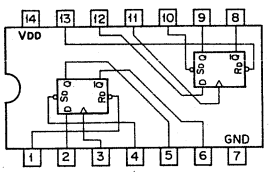
NON-RETRIGGERABLE M.M.V



MC74HC74AF (MOTOROLA) FLAT PACKAGE

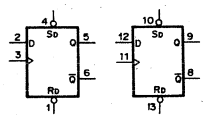
C-MOS D-TYPE FLIP FLOP WITH DIRECT SET/RESET

– TOP VIEW –



INPUTS				OUTPUTS	
$\overline{S_D}$	$\overline{R_D}$	CK	D	Qn+1	$\overline{Q_{n+1}}$
0	1	X	X	1	0
1	0	X	X	0	1
0	0	X	X	1	1
1	1	↑	1	1	0
1	1	↑	0	0	1
1	1	0	X	Qn	$\overline{Q_n}$

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE

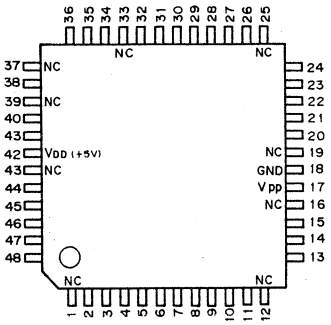


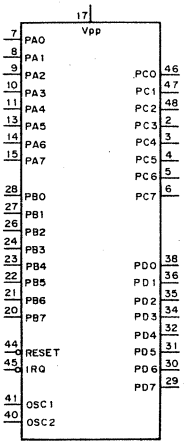
NOTE :

TYPE	VDD
74ACT	+5V
TC74AC74F	+2 to +5.5V
TC74ACT74F	+4.5 to +5.5V
OTHER TYPES	+2 to +6V

SC406670FU (MOTOROLA)

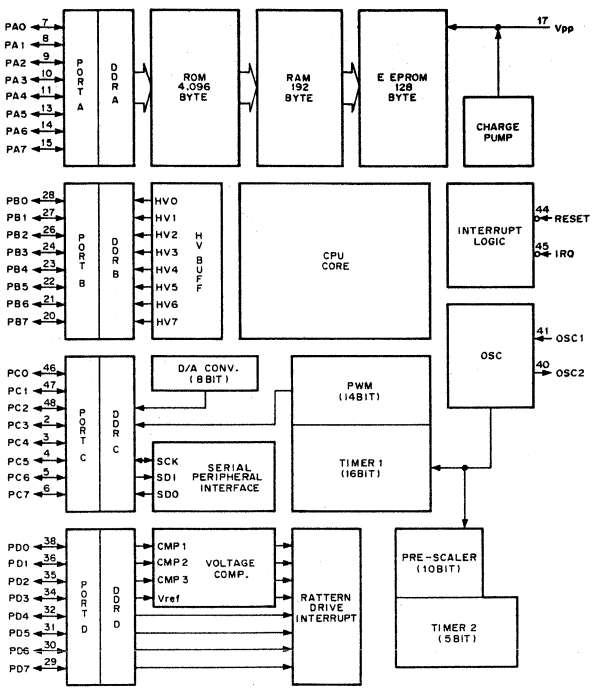
C-MOS 8-BIT MICROPROCESSOR
– TOP VIEW –





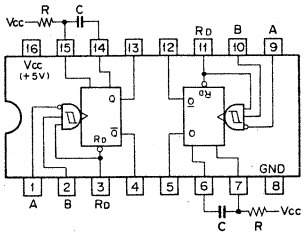
IRQ ; INTERRUPT REQUEST INPUT
OSC1 ; OSC FREQ INPUT
OSC2 ; OSC FREQ OUTPUT
PA0 – PA7 ; I/O PORT A
PB0 – PB7 ; I/O PORT B
PC0 – PC7 ; I/O PORT C
PD0 – PD7 ; I/O PORT D
RESET ; RESET PULSE INPUT

PIN NO.	I/O	SYMBOL	PIN NO.	I/O	SYMBOL	PIN NO.	I/O	SYMBOL	PIN NO.	I/O	SYMBOL
1	–	NC	13	I/O	PA5	25	–	NC	37	–	NC
2	I/O	PC3	14	I/O	PA6	26	I/O	PB2	38	I/O	PD0
3	I/O	PC4	15	I/O	PA7	27	I/O	PB1	39	–	NC
4	I/O	PC5	16	–	NC	28	I/O	PB0	40	O	OSC2
5	I/O	PC6	17	I	Vpp	29	I/O	PD7	41	I	OSC1
6	I/O	PC7	18	–	GND	30	I/O	PD6	42	–	VDD (+5V)
7	I/O	PA0	19	–	NC	31	I/O	PD5	43	–	NC
8	I/O	PA1	20	I/O	PB7	32	I/O	PD4	44	I	RESET
9	I/O	PA2	21	I/O	PB6	33	–	NC	45	I	IRQ
10	I/O	PA3	22	I/O	PB5	34	I/O	PD3	46	I/O	PC0
11	I/O	PA4	23	I/O	PB4	35	I/O	PD2	47	I/O	PC1
12	–	NC	24	I/O	PB3	36	I/O	PD1	48	I/O	PC2



SN74LS221NS (TI) FLAT PACKAGE

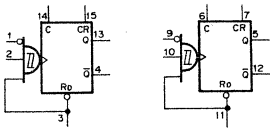
TTL MONOSTABLE MULTIVIBRATOR WITH SCHMITT TRIGGER INPUT
– TOP VIEW –



INPUTS			OUTPUTS	
RD	A	B	Q	$\overline{Q}$
0	X	X	0	1
X	1	X	0	1
X	X	0	0	1
1	0	↑	⎍	⎍
1	↓	1	⎍	⎍
↑	0	1	⎍	⎍

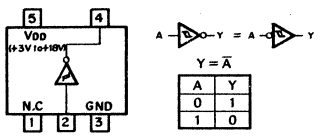
0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE

OUTPUT PULSE WIDTH = 0.7CR



TC4S584F (TOSHIBA) FLAT PACKAGE

C-MOS SCHMITT TRIGGER INVERTER
– TOP VIEW –

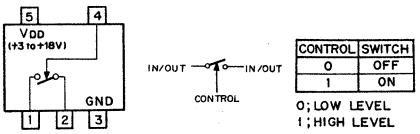


A	Y
0	1
1	0

0 ; LOW LEVEL
1 ; HIGH LEVEL

TC4S66F (TOSHIBA)

C-MOS BILATERAL ANALOG SWITCH
– TOP VIEW –

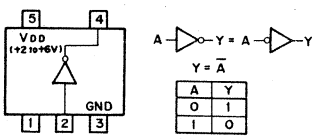


CONTROL	SWITCH
0	OFF
1	ON

0 ; LOW LEVEL
1 ; HIGH LEVEL

TC7S04F (TOSHIBA) FLAT PACKAGE

C-MOS INVERTER
– TOP VIEW –



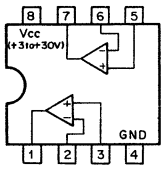
A	Y
0	1
1	0

0 ; LOW LEVEL
1 ; HIGH LEVEL

uPC358G2 (NEC) FLAT PACKAGE

DUAL OPERATIONAL AMPLIFIERS

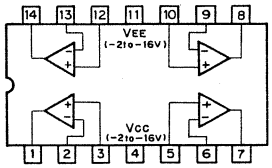
– TOP VIEW –



uPC4064G (NEC) FLAT PACKAGE

TTL-QUAD OPERATIONAL AMPLIFIER WITH LOW POWER CONSUMPTION

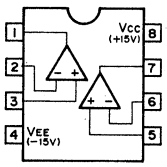
– TOP VIEW –



uPC4570G2 (NEC) FLAT PACKAGE

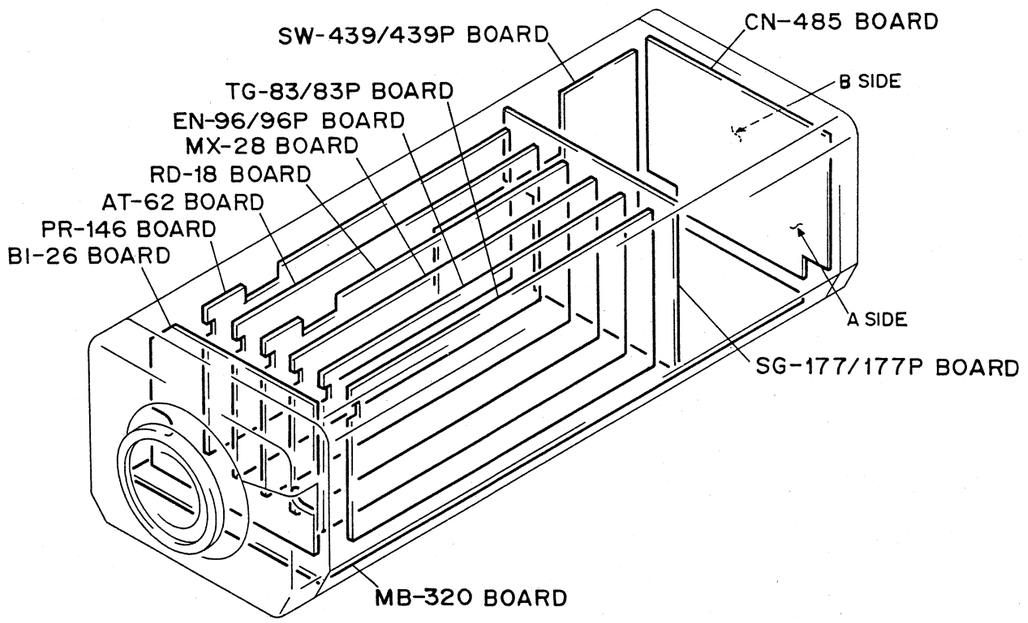
OPERATIONAL AMPLIFIER

– TOP VIEW –

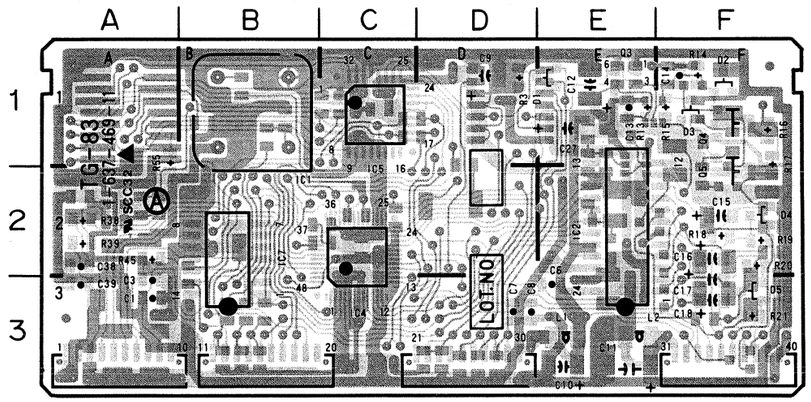


SECTION C
SCHEMATIC DIAGRAMS AND BOARD ILLUSTRATION

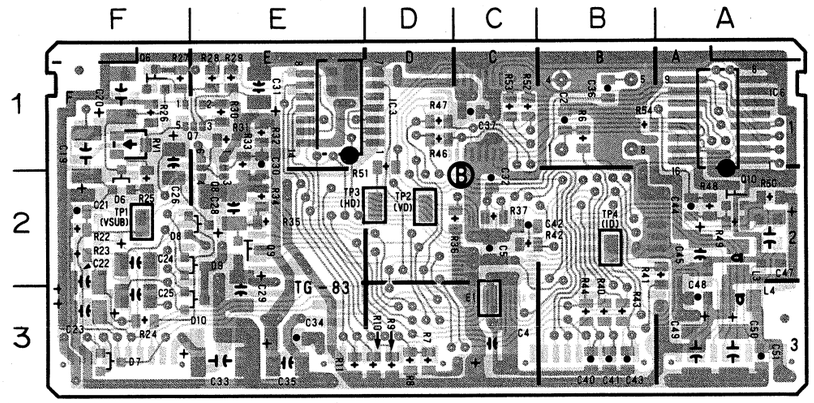
BOARD LAYOUT



TG-83/83P



TG-83/83P – A SIDE –
1-637-469-11
DXC-151 (UC,J)
DXC-151P (EK)



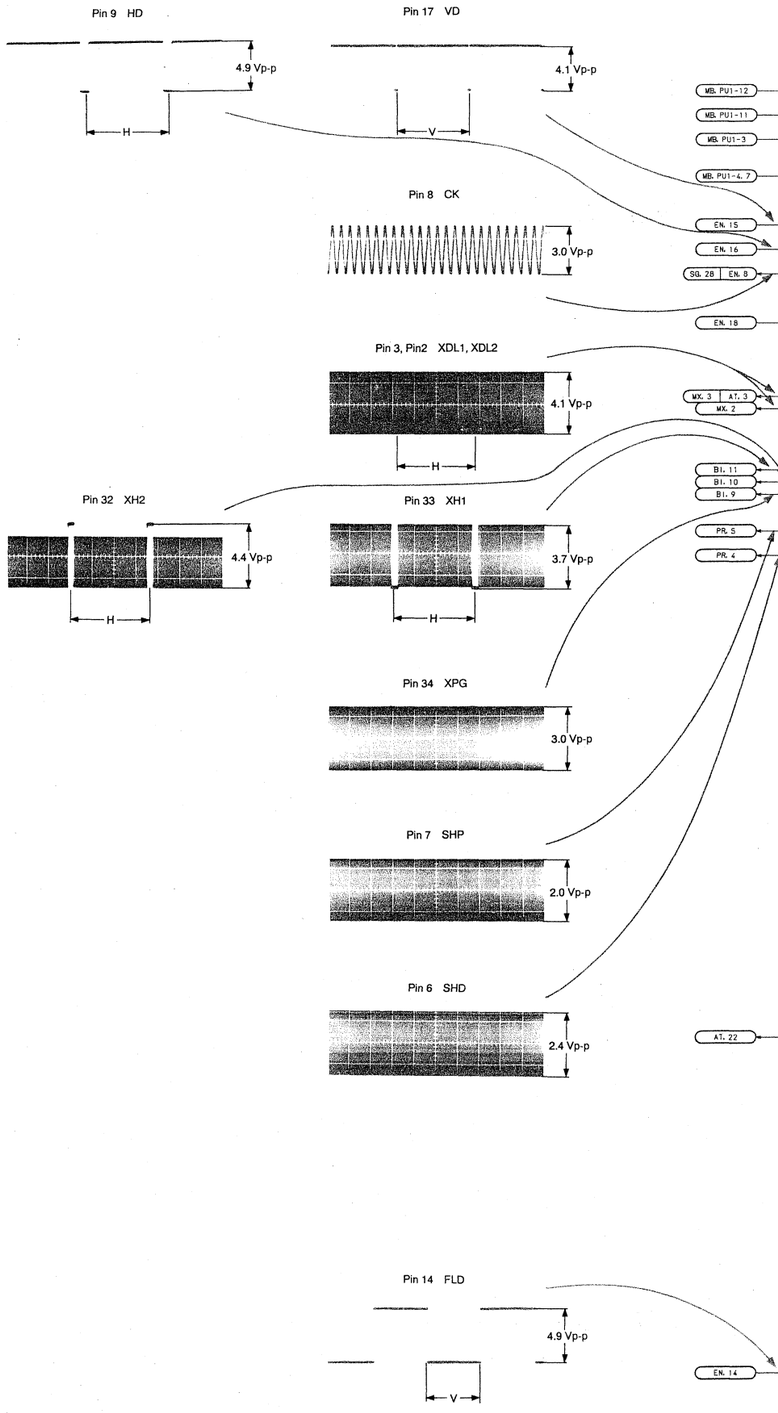
TG-83/83P – B SIDE –
1-637-469-11
DXC-151 (UC,J)
DXC-151P (EK)

TG-83/83P 1-637-469-11

D1	E-1
D2	F-1
D3	F-1
D4	F-2
D5	F-3
D6	* F-2
D7	* F-3
D8	* E-2
D9	* E-2
D10	* E-3
IC1	B-1
IC2	E-2
IC3	* E-1
IC4	C-2
IC5	C-1
IC7	B-2
Q3	E-1
Q4	F-1
Q5	F-2
Q6	* F-1
Q7	* E-1
Q8	* E-1
Q9	* E-1
Q10	* A-2
RV1	* F-1
TP1	* F-1
TP2	* D-2
TP3	* D-2
TP4	* B-2

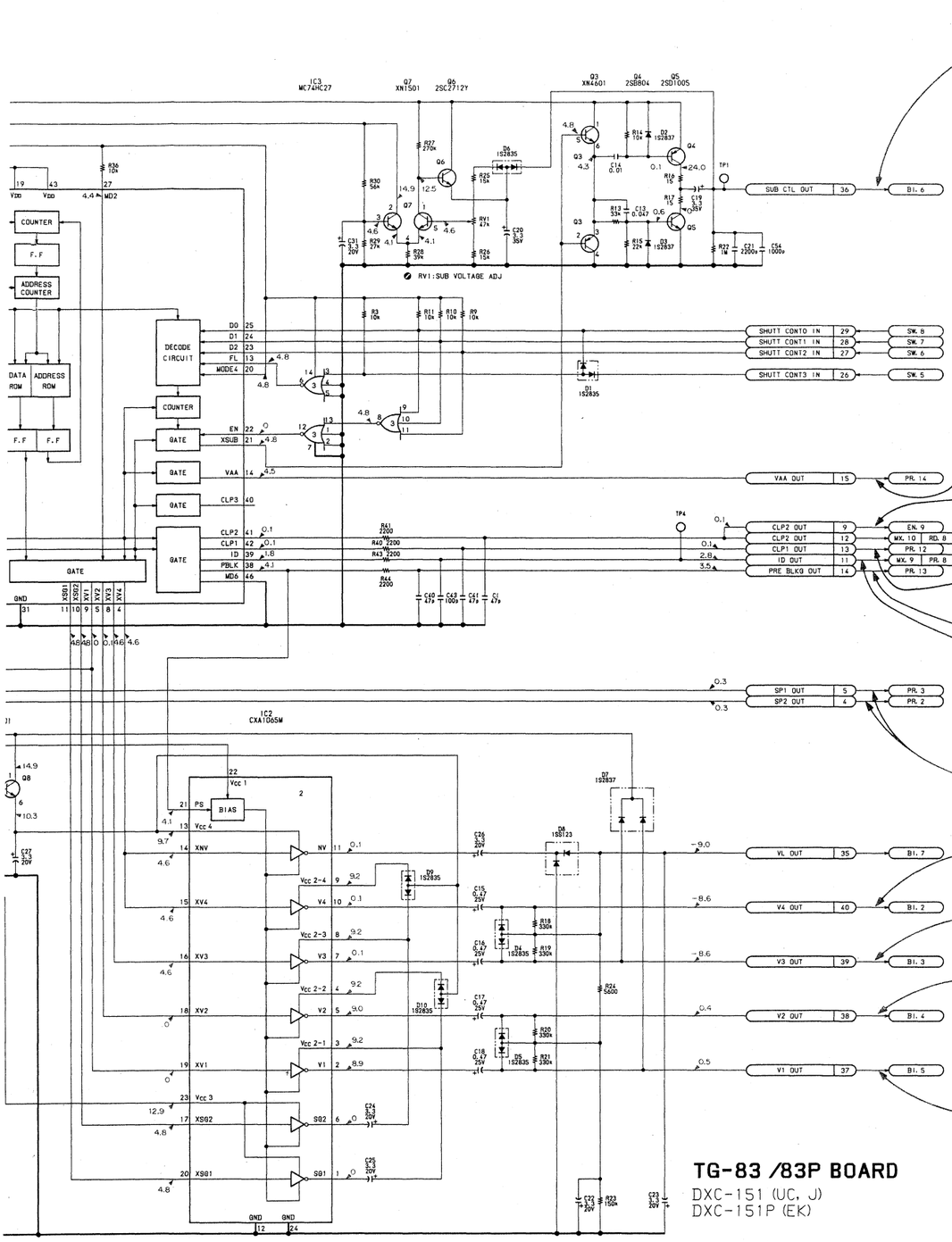
* : B SIDE

TG-83/83P BOARD



C-5

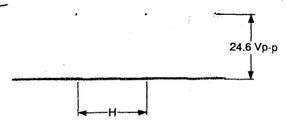
C-6



TG-83 /83P BOARD

DXC-151 (UC, J)
DXC-151P (EK)

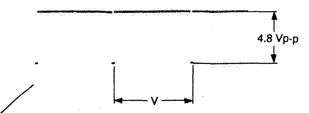
Pin 36 SUB CONT (SHUTTER SW: FL)



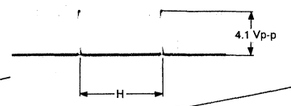
SHUTTER CONT 3 (Pin 26)	SHUTTER CONT 2 (Pin 27)	SHUTTER CONT 1 (Pin 28)	SHUTTER CONT 0 (Pin 29)	SHUTTER SWITCH
L	L	L	L	OFF
L	L	L	H	1/125
L	L	H	L	1/250
L	L	H	H	1/500
L	H	L	L	1/1000
L	H	L	H	1/2000
L	H	H	L	1/4000
L	H	H	H	1/10000
H	L	L	L	FL

L : 0V
H : 4.7V

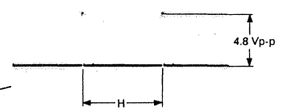
Pin 14 VAA



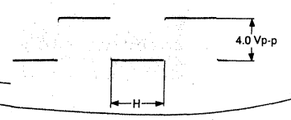
Pin 11 CLP2



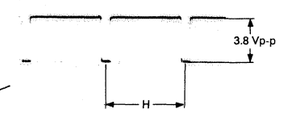
Pin 12 CLP1



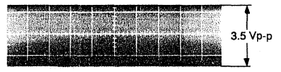
Pin 13 PRE BLKG



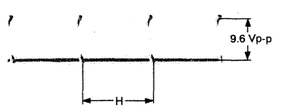
Pin 8 ID



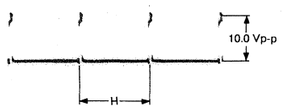
Pin 5, Pin4 SP1, SP2



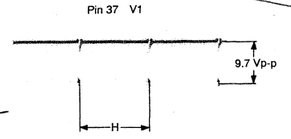
Pin 39 V3



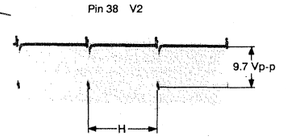
Pin 40 V4



Pin 37 V1



Pin 38 V2



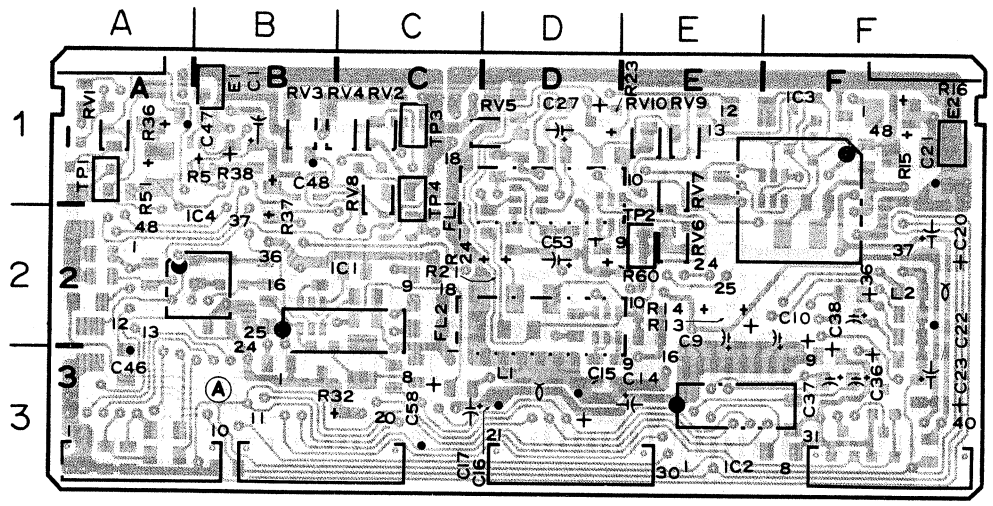
注意：

1. DC電圧はデジタル電圧計にて測定。
   （入力インピーダンス 10MΩ）
2. 波形および電圧の測定の時，端子間が狭いので回路のショートには注意して下さい。
3. 基板を延長する時は，必ず電源を「OFF」の状態で行って下さい。

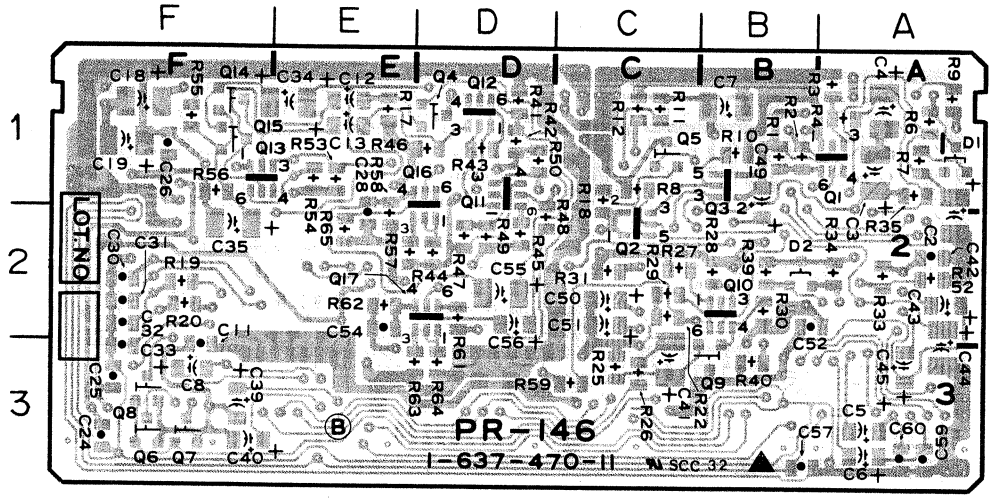
NOTE:

1. All voltage are measured with a digital voltmeter (input resistance 10 MΩ).
2. Since there is very narrow space between the pins, pay attention not to short-circuit when measuring the waveform and voltage.
3. When extending the board, be sure to turn OFF the power.

PR-146 BOARD



PR-146 – A SIDE –
1-637-470-11
DXC-151 (UC,J)
DXC-151P (EK)



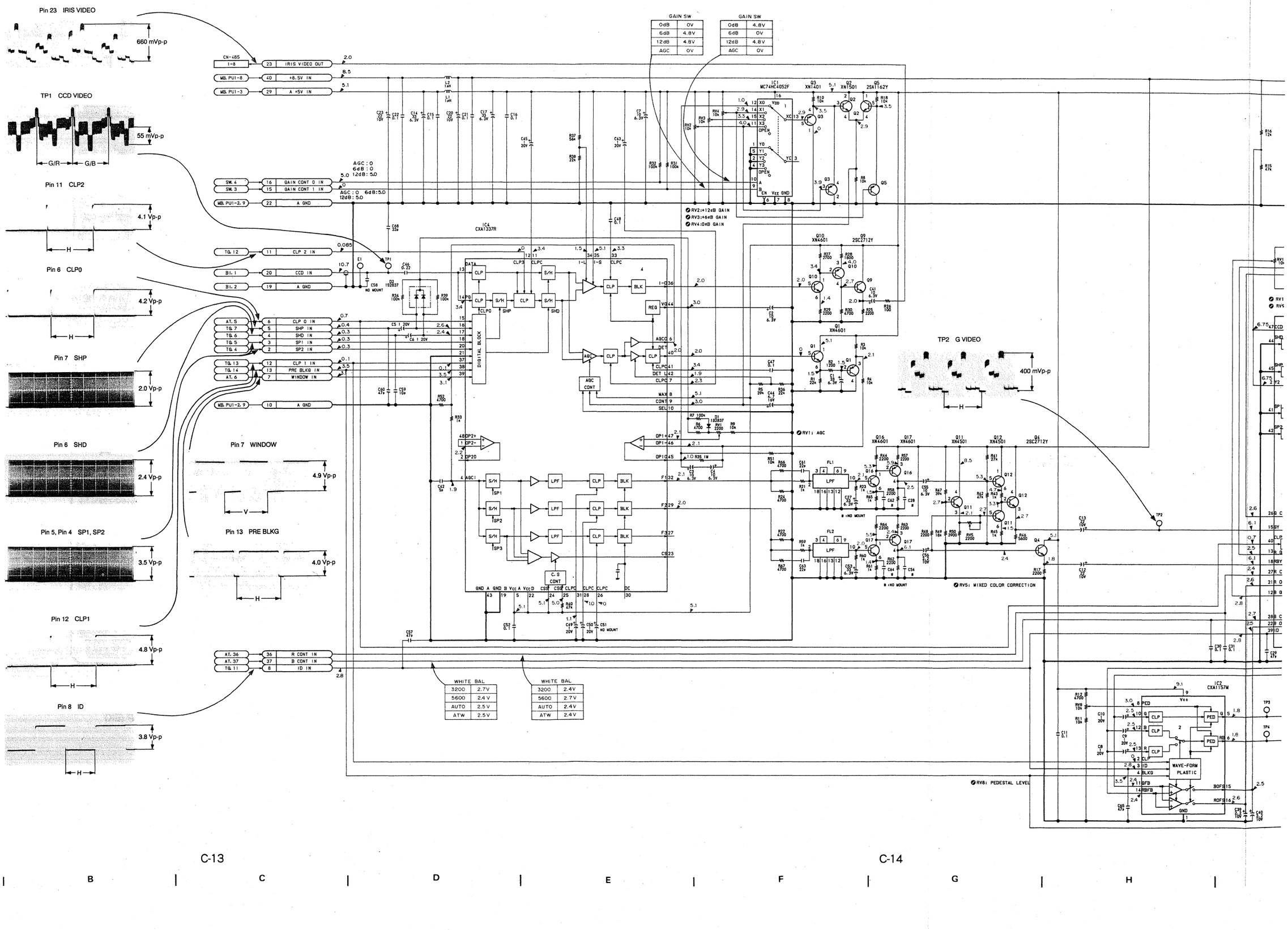
PR-146 – B SIDE –
1-637-470-11
DXC-151 (UC,J)
DXC-151P (EK)

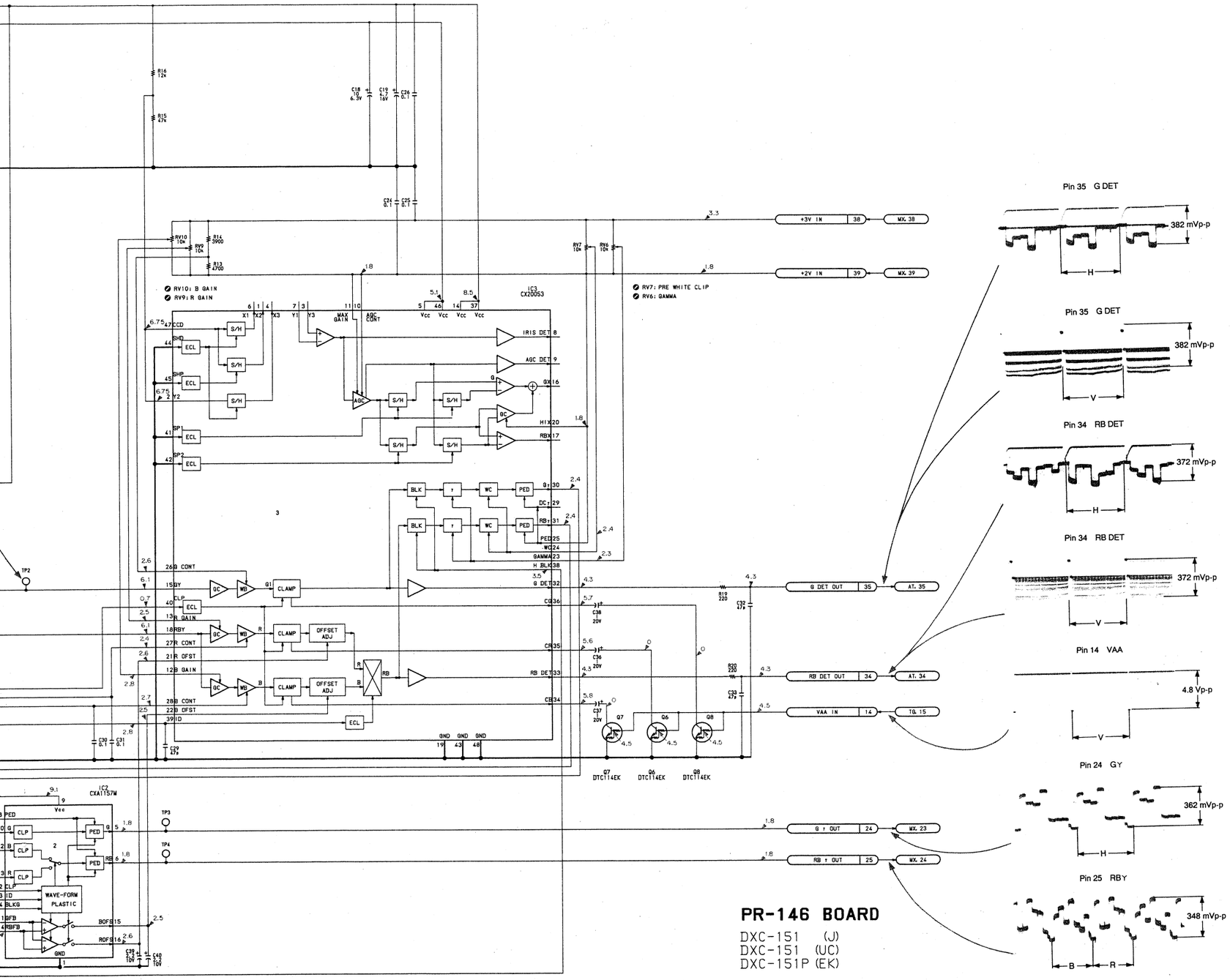
PR-146 1-637-470-11

D1	* A-1
D2	* B-2
E1	B-1
E2	F-1
FL1	D-1
FL2	D-2
IC1	C-2
IC2	E-3
IC3	F-1
IC4	B-2
Q1	* A-1
Q2	* C-2
Q3	* B-1
Q4	* D-1
Q5	* C-1
Q6	* F-3
Q7	* F-3
Q8	* F-3
Q9	* B-3
Q10	* B-2
Q11	* D-1
Q12	* D-1
Q13	* F-1
Q14	* F-1
Q15	* F-1
Q16	* D-1
Q17	* D-2
RV1	A-1
RV2	C-1
RV3	B-1
RV4	C-1
RV5	D-1
RV6	E-2
RV7	E-1
RV8	C-1
RV9	E-1
RV10	E-1
TP1	A-1
TP2	E-2
TP3	C-1
TP4	C-1

* : B SIDE

PR-146 BOARD


Pin 23 IRIS VIDEO
660 mVp-p
TP1 CCD VIDEO
55 mVp-p
G/R
G/B
Pin 11 CLP2
4.1 Vp-p
H
Pin 6 CLP0
4.2 Vp-p
H
Pin 7 SHP
2.0 Vp-p
Pin 6 SHD
2.4 Vp-p
Pin 7 WINDOW
4.9 Vp-p
V
Pin 5, Pin 4 SP1, SP2
3.5 Vp-p
Pin 13 PRE BLKG
4.0 Vp-p
H
Pin 12 CLP1
4.8 Vp-p
H
Pin 8 ID
3.8 Vp-p
H
CN-485
IRIS VIDEO OUT
+8.5V IN
A +5V IN
GAIN CONT 0 IN
GAIN CONT 1 IN
A GND
CLP 2 IN
CCD IN
A GND
CLP 0 IN
SHP IN
SHD IN
SP1 IN
SP2 IN
CLP 1 IN
PRE BLKG IN
WINDOW IN
A GND
R CONT IN
B CONT IN
ID IN
GAIN SW
0dB 0V
6dB 4.8V
12dB 4.8V
AGC 0V
GAIN SW
0dB 4.8V
6dB 0V
12dB 4.8V
AGC 0V
IC1 MC74HC4052F
Q3 XN1401
Q2 XN1501
Q5 2SA1162Y
RV2:+12dB GAIN
RV3:+6dB GAIN
RV4:0dB GAIN
IC4 CXA1337R
Q10 XN4601
Q9 2SC2712Y
Q1 XN4601
TP2 G VIDEO
400 mVp-p
H
DIGITAL BLOCK
RV1: AGC
Q16 XN4601
Q17 XN4601
Q11 XN4501
Q12 XN4501
Q4 2SC2712Y
FL1
FL2
LPF
RV5: MIXED COLOR CORRECTION
RV6: PEDESTAL LEVEL
IC2 CXA1357M
WAVE-FORM PLASTIC
WHITE BAL
3200 2.7V
5600 2.4 V
AUTO 2.5 V
ATW 2.5V
WHITE BAL
3200 2.4V
5600 2.7V
AUTO 2.4V
ATW 2.4V



Pin 35 G DET

Pin 35 G DET

Pin 34 RB DET

Pin 34 RB DET

Pin 14 VAA

Pin 24 GY

Pin 25 RBY

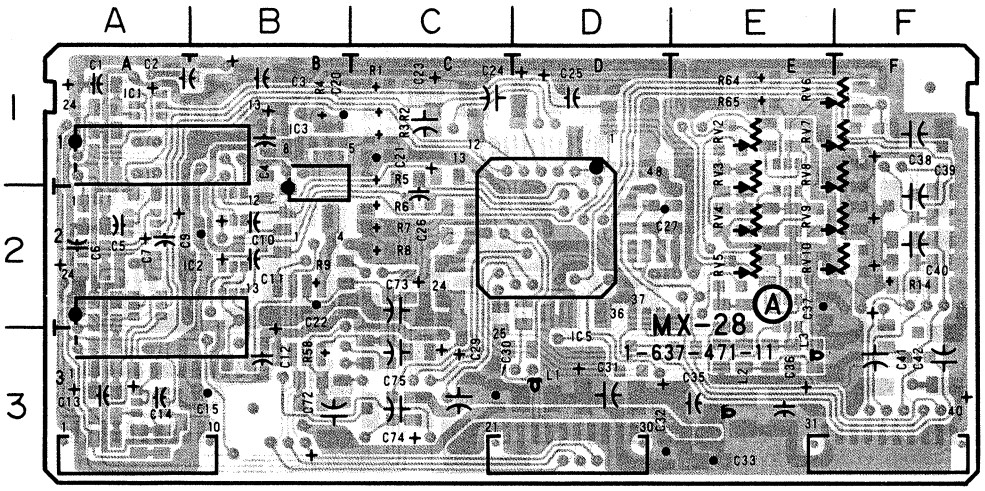
注意：

1. DC電圧はデジタル電圧計による値。
   (入力インピーダンス 10MΩ)
2. 波形写真は下記条件で撮影。
   - PR-146基板, TP2にてカラーバーの白部分が400mVp-pになるようレンズアイリスをセットする。
     (F ≒ 5.6, 波形モニターで100IRE)
   - WHITE BALスイッチ→ "3200" 位置
   - GAINスイッチ→ "0dB" 位置
3. 波形および電圧の測定の時, 端子間が狭いので回路のショートには注意して下さい。
4. 基板を延長する時は, 必ず電源を「OFF」の状態で行って下さい。

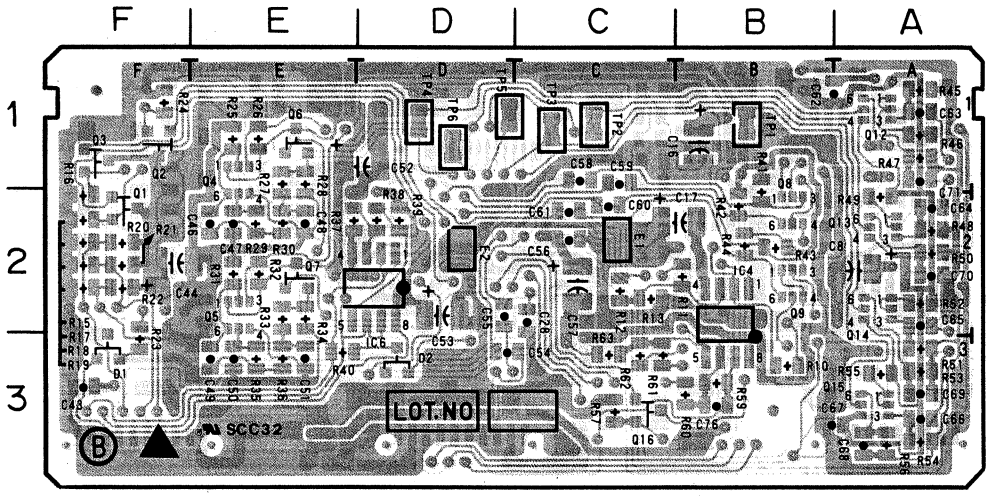
NOTE:

1. All voltage are dc, measured with a digital voltmeter (input resistance 10 MΩ).
2. All waveforms are taken in conditions below.
   - Shoot the color bar pattern on the pattern box.
     Adjust lens iris so that a white level at TP2/PR-146 board is 400 mV. [F ≒ 5.6, White level on the waveform monitor is 100 IRE (700 mV for PAL)]
   - Set the camera WHITE BAL switch to "3200".
   - Set the camera GAIN switch to "0 dB".
3. Since there is very narrow space between the pins, pay attention not to short-circuit when measuring the waveform and voltage.
4. When extending the board, be sure to turn OFF the power.

MX-28 BOARD



MX-28 – A SIDE –
1-637-471-11
DXC-151 (UC,J)
DXC-151P (EK)



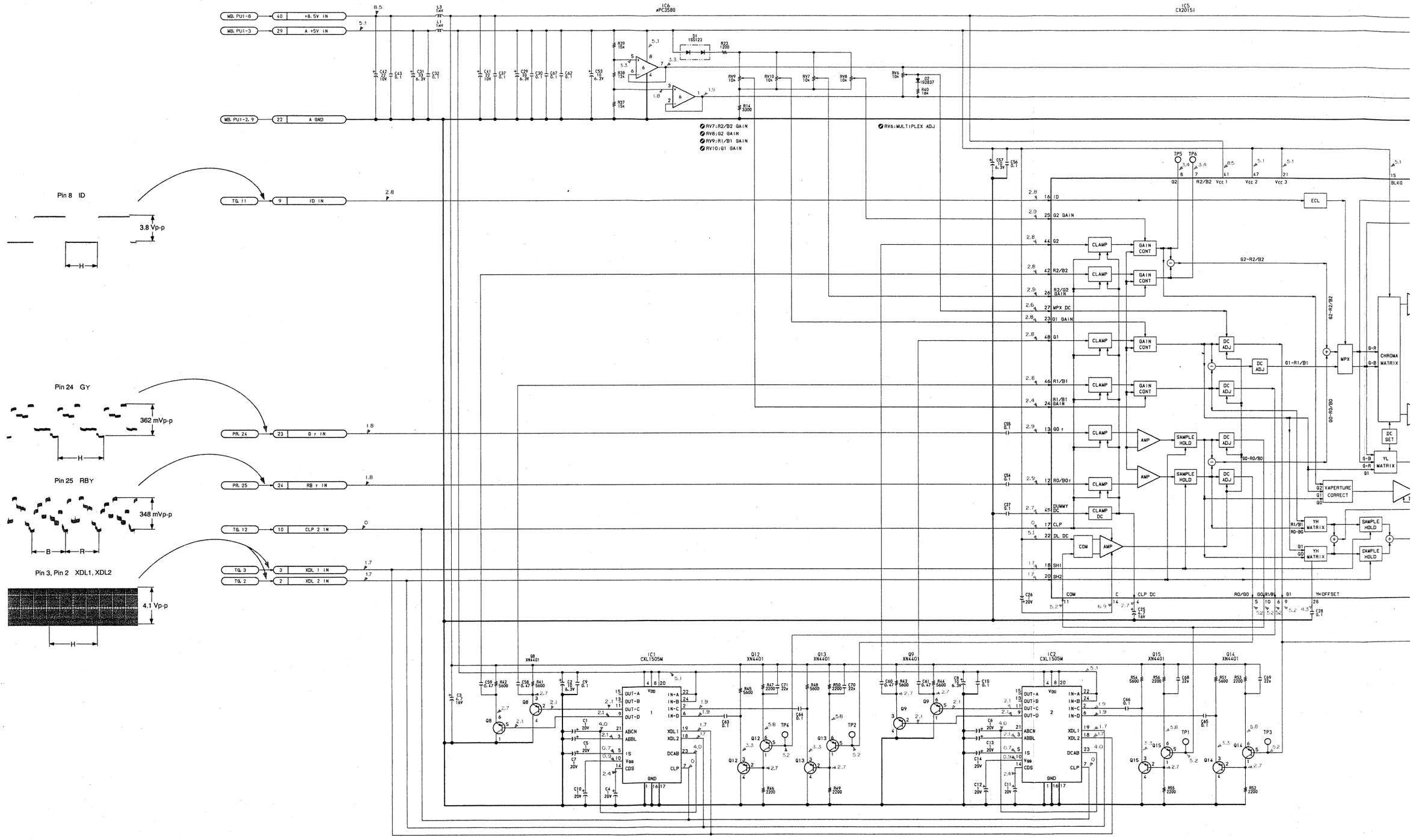
MX-28 – B SIDE –
1-637-471-11
DXC-151 (UC,J)
DXC-151P (EK)

MX-28 1-637-471-11

D1	* F-2
D2	* D-3
E1	* C-2
E2	* D-2
IC1	A-1
IC2	A-2
IC3	B-1
IC4	* B-2
IC5	D-2
IC6	* D-2
Q1	* F-2
Q2	* F-1
Q3	* F-1
Q4	* E-1
Q5	* E-2
Q6	* E-1
Q7	* E-2
Q8	* B-1
Q9	* B-2
Q12	* A-1
Q13	* A-2
Q14	* A-2
Q15	* A-3
Q16	* C-3
RV2	E-1
RV3	E-1
RV4	E-2
RV5	E-2
RV6	F-1
RV7	F-1
RV8	F-1
RV9	F-2
RV10	F-2
TP1	* B-1
TP2	* C-1
TP3	* C-1
TP4	* D-1
TP5	* D-1
TP6	* D-1

* : B SIDE

MX-28 BOARD

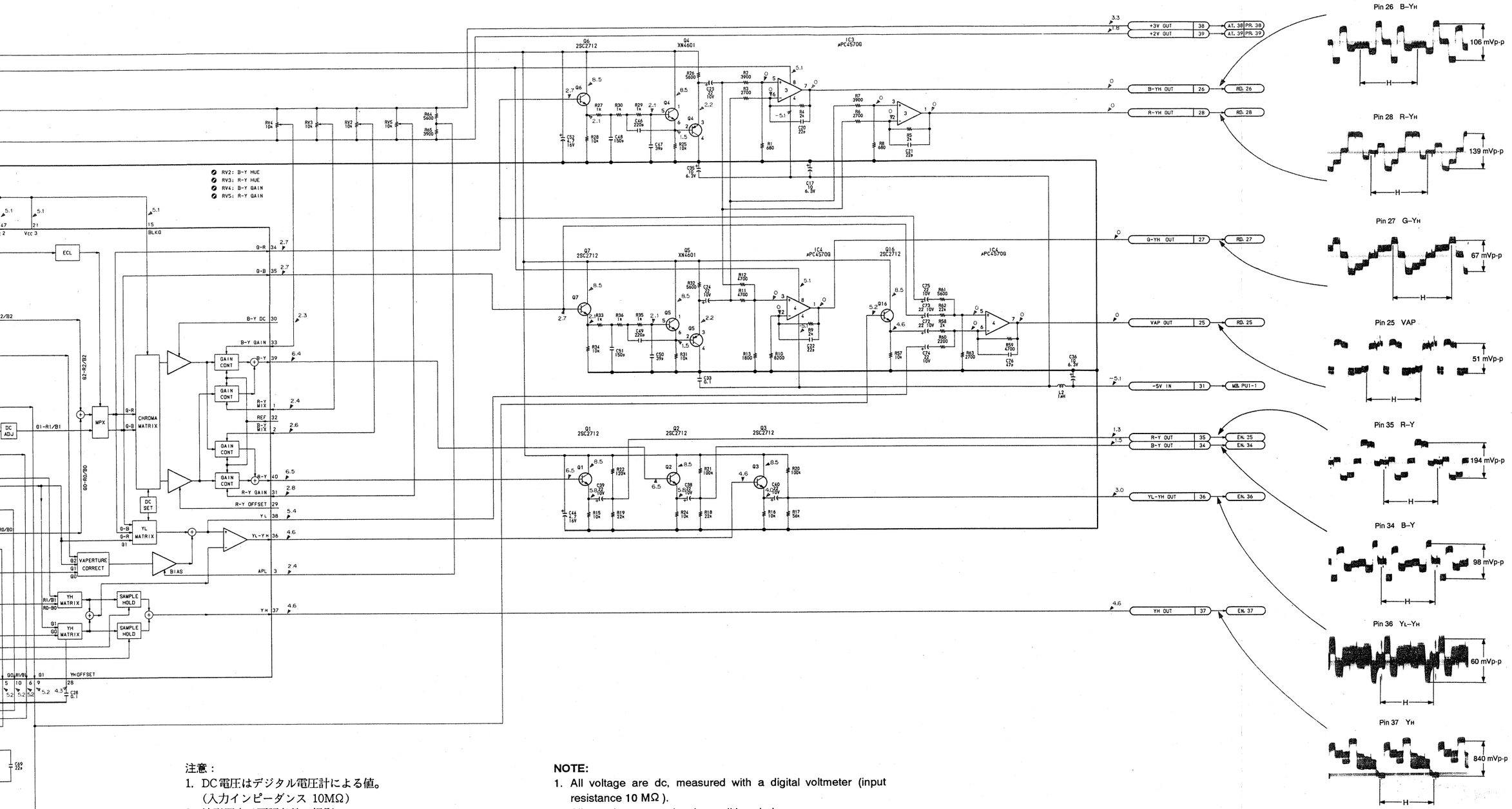


C-21

C-22

DXC-151 (UC, J)
DXC-151P (EK)

A | B | C | D | E | F | G | H



注意：

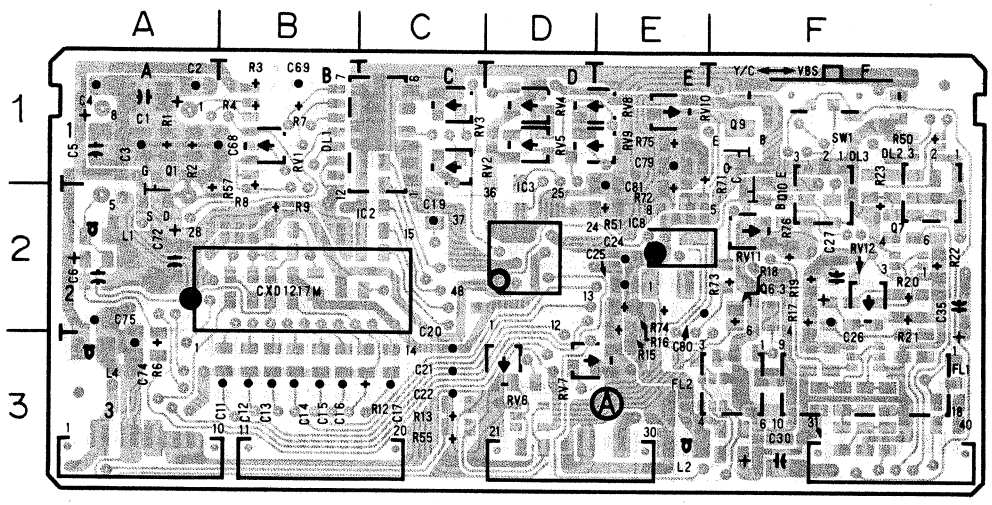
1. DC電圧はデジタル電圧計による値。
   （入力インピーダンス 10MΩ）
2. 波形写真は下記条件で撮影。
   - VIDEO OUT端子にてカラーバーの白部分が100IREになるようレンズアイリスをセットする。（F ≒ 5.6）
   - WHITE BALスイッチ→ “3200” 位置
   - GAINスイッチ→ “0dB” 位置
3. 波形および電圧の測定の時，端子間が狭いので回路のショートには注意して下さい。
4. 基板を延長する時は，必ず電源を「OFF」の状態で行って下さい。

NOTE:

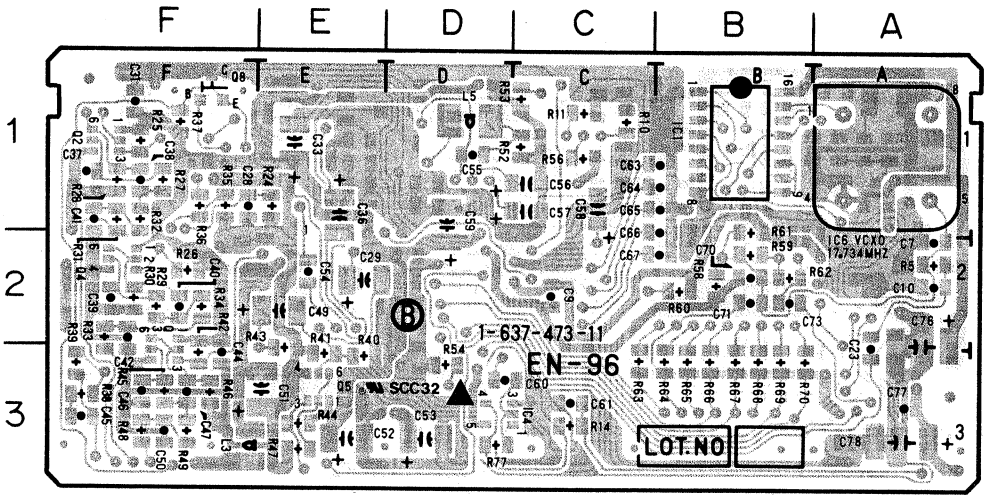
1. All voltage are dc, measured with a digital voltmeter (input resistance 10 MΩ).
2. All waveforms are taken in conditions below.
   - Shoot the color bar pattern on the pattern box. Adjust lens iris so that a white level at VIDEO OUT connector is 100 IRE (700 mV for PAL). [F ≒ 5.6]
   - Set the camera WHITE BAL switch to “3200”.
   - Set the camera GAIN switch to “0 dB”.
3. Since there is very narrow space between the pins, pay attention not to short-circuit when measuring the waveform and voltage.
4. When extending the board, be sure to turn OFF the power.

MX-28 BOARD
DXC-151 (J)
DXC-151 (UC)
DXC-151P (EK)

EN-96/96P BOARD



EN-96/96P – A SIDE –
1-637-473-11
DXC-151 (UC,J)
DXC-151P (EK)



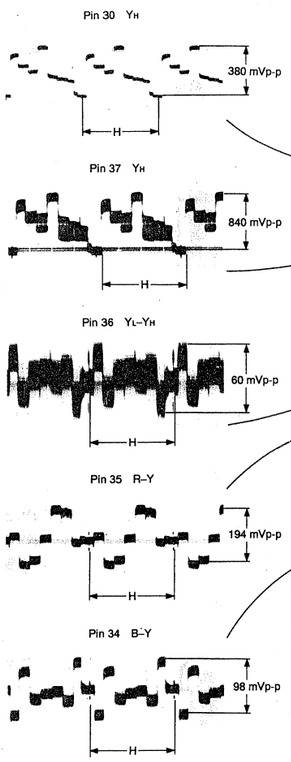
EN-96/96P – B SIDE –
1-637-473-11
DXC-151 (UC,J)
DXC-151P (EK)

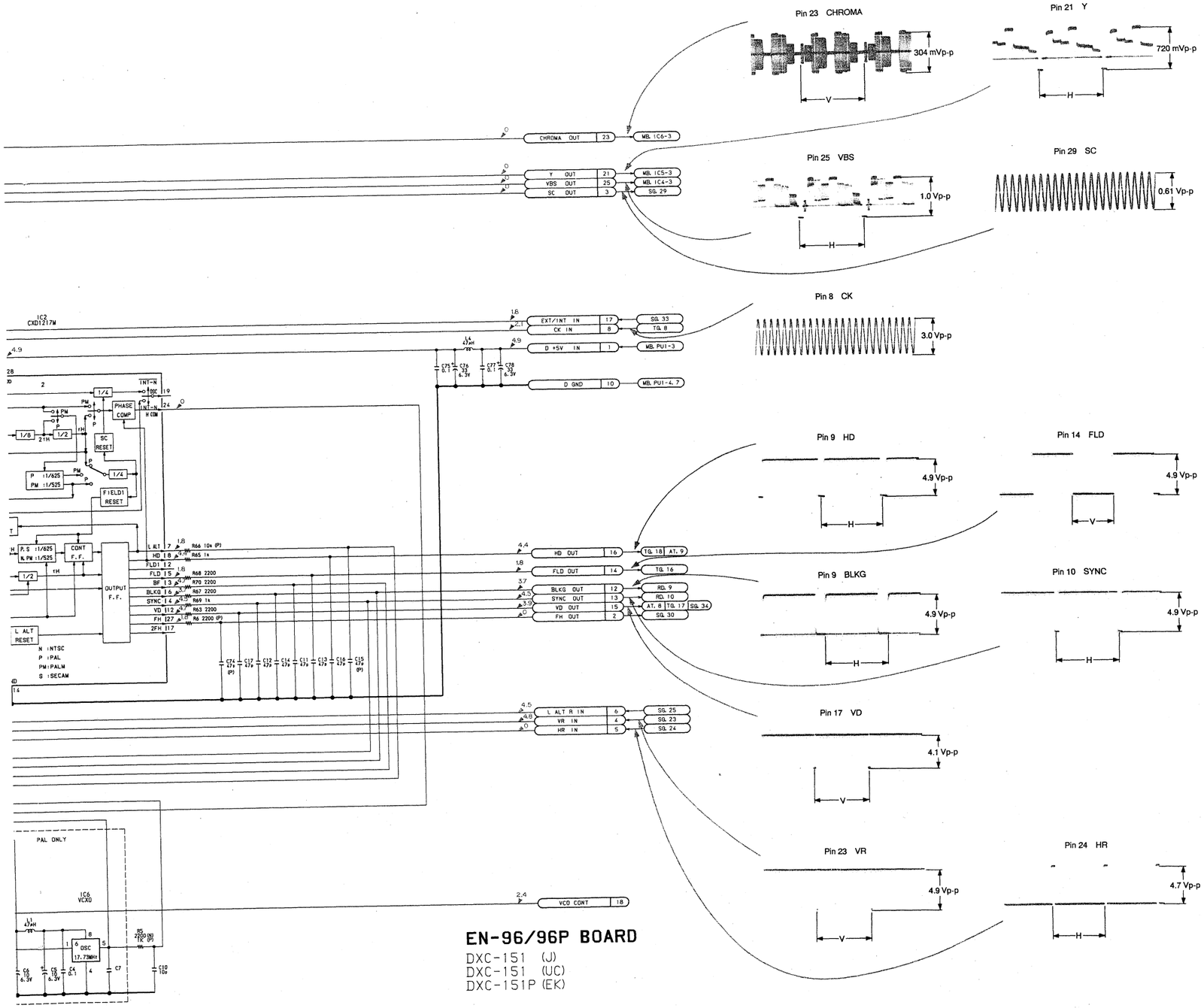
EN-96/96P 1-637-473-11

DL1	C-1
DL2	F-1
DL3	F-1
FL1	F-3
FL2	F-3
IC1	* B-1
IC2	B-2
IC3	D-2
IC4	* C-3
IC6(P)	* A-1
IC8(N)	* A-1
IC8(P)	F-2
Q1(P)	A-1
Q2	* F-1
Q3	* F-2
Q4	* F-2
Q5	* E-3
Q6	F-2
Q7	F-2
Q8	* F-1
Q9	F-1
Q10	F-1
RV1	B-1
RV2	C-1
RV3	C-1
RV4	D-1
RV5	D-1
RV6(P)	D-3
RV7	D-3
RV8	E-1
RV9	E-1
RV10	E-1
RV11	F-2
SW1	F-1

* : B SIDE

EN-96/96P BOARD





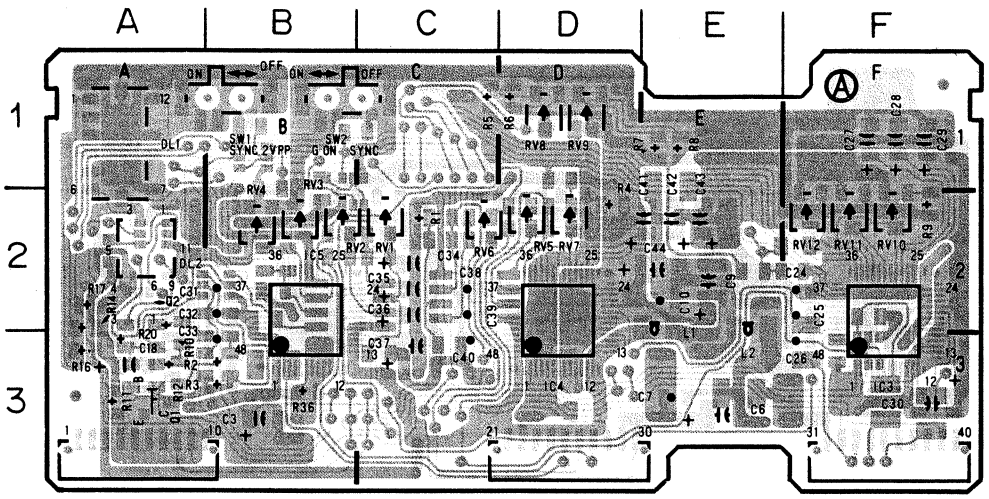
注意：

1. DC電圧はデジタル電圧計による値。
   （入力インピーダンス 10MΩ）
2. 波形写真は下記条件で撮影。
   - VIDEO OUT端子にてカラーバーの白部分が100IREになるようレンズアイリスをセットする。(F ≒ 5.6)
   - WHITE BALスイッチ→“3200”位置
   - GAINスイッチ→“0dB”位置
3. 波形および電圧の測定の時，端子間が狭いので回路のショートには注意して下さい。
4. 基板を延長する時は，必ず電源を「OFF」の状態で行って下さい。

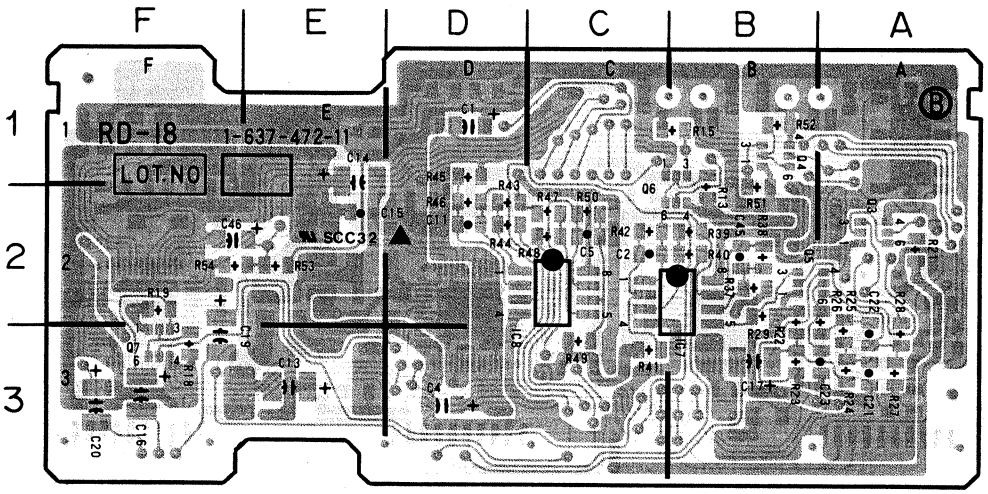
NOTE:

1. All voltage are dc, measured with a digital voltmeter (input resistance **10 MΩ**).
2. All waveforms are taken in conditions below.
   - Shoot the color bar pattern on the pattern box. Adjust lens iris so that a white level at VIDEO OUT connector is 100 IRE (700 mV for PAL). [F ≒ 5.6]
   - Set the camera WHITE BAL switch to “3200”.
   - Set the camera GAIN switch to “0 dB”.
3. Since there is very narrow space between the pins, pay attention not to short-circuit when measuring the waveform and voltage.
4. When extending the board, be sure to turn OFF the power.

RD-18 BOARD



RD-18 – A SIDE –
1-637-472-11
DXC-151 (UC,J)
DXC-151P (EK)



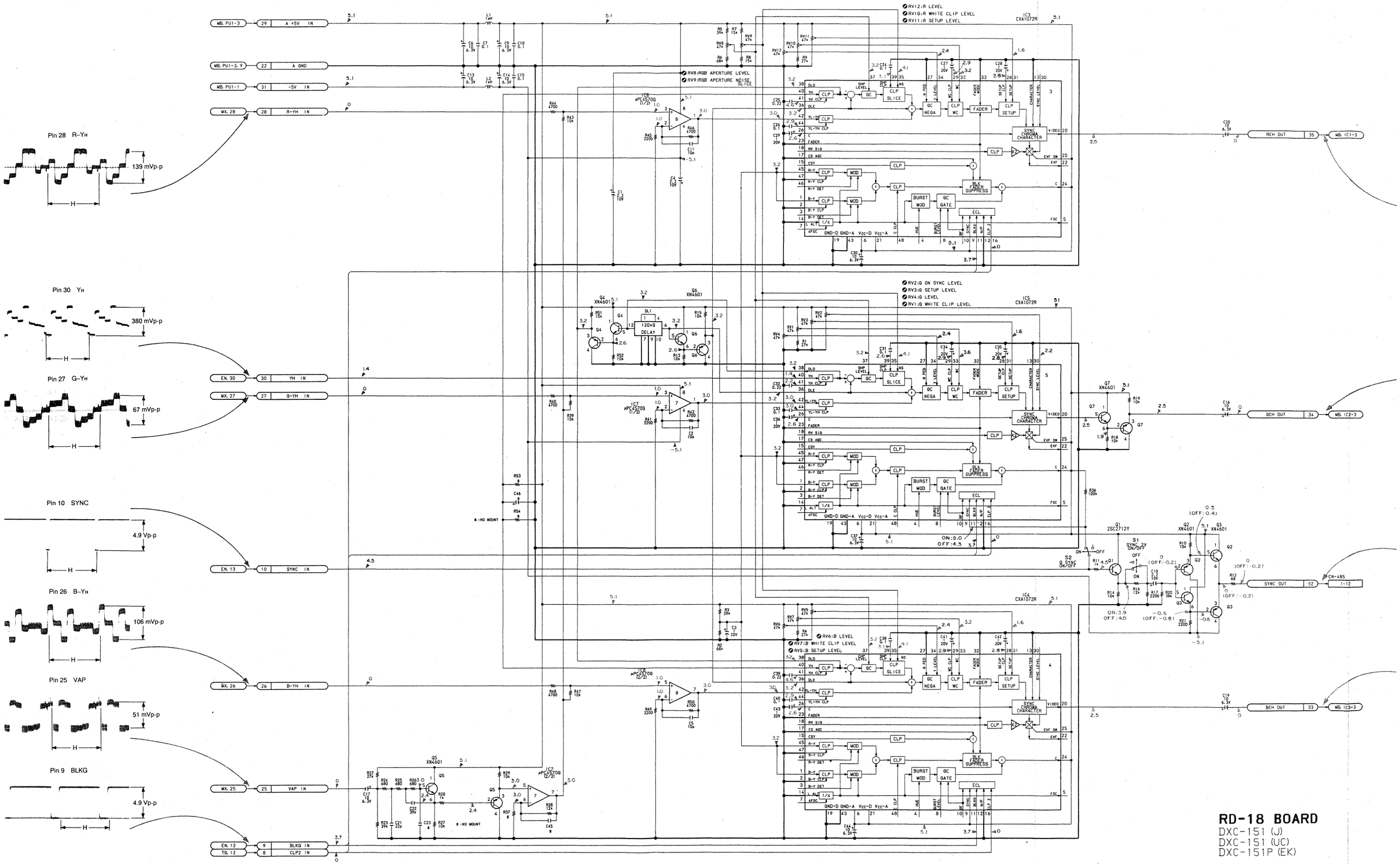
RD-18 – B SIDE –
1-637-472-11
DXC-151 (UC,J)
DXC-151P (EK)

RD-18 1-637-472-11

DL1	A-1
DL2	A-2
IC3	F-2
IC4	D-2
IC5	B-2
IC7	* B-3
IC8	* C-3
Q1	A-3
Q2	A-2
Q3	* A-2
Q4	* B-1
Q5	* B-2
Q6	* B-2
Q7	* F-3
RV1	C-2
RV2	B-2
RV3	B-2
RV4	B-2
RV5	D-2
RV6	C-2
RV7	D-2
RV8	D-1
RV9	D-1
RV10	F-2
RV11	F-2
RV12	F-2
SW1	B-1
SW2	B-1

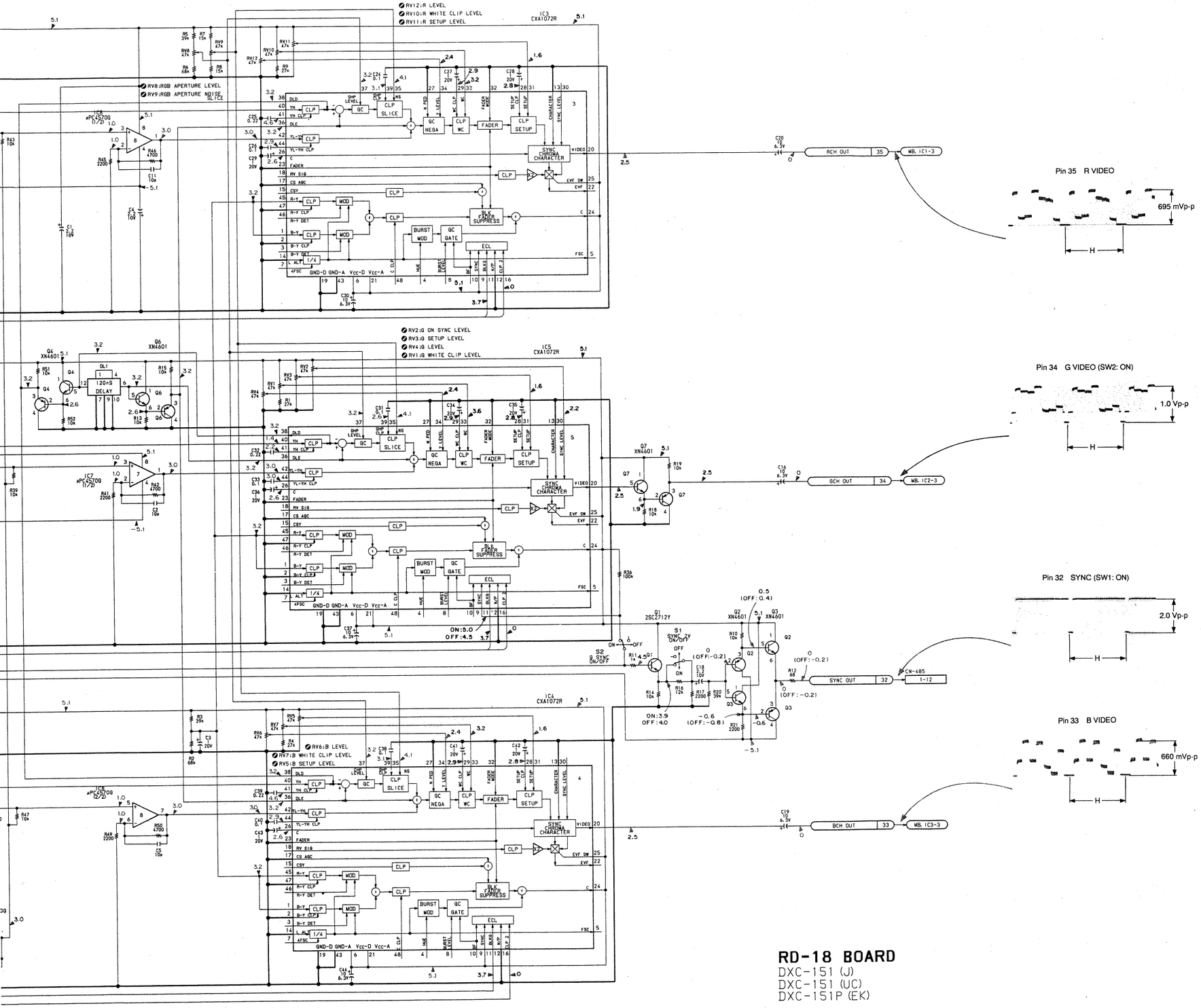
* : B SIDE

RD-18 BOARD



RD-18 BOARD

DXC-151 (J)
DXC-151 (UC)
DXC-151P (EK)

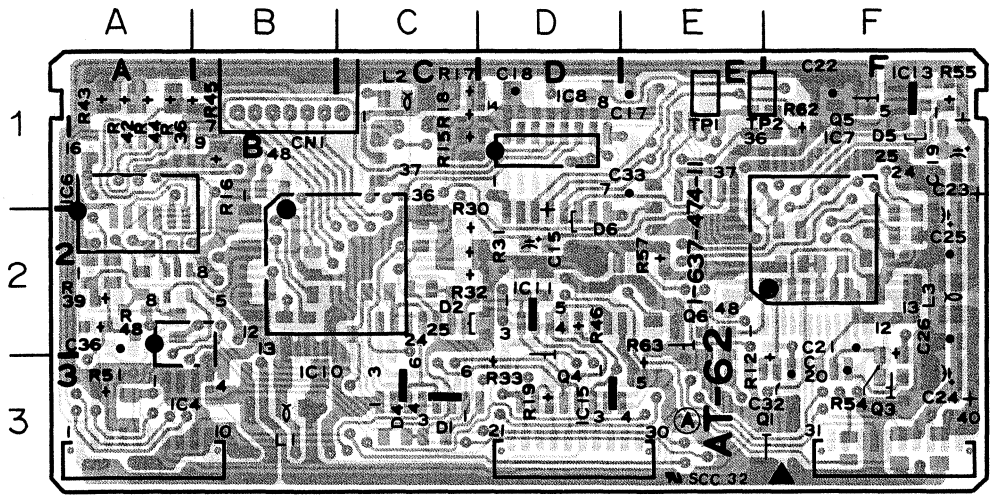


RD-18 BOARD
DXC-151 (J)
DXC-151 (UC)
DXC-151P (EK)

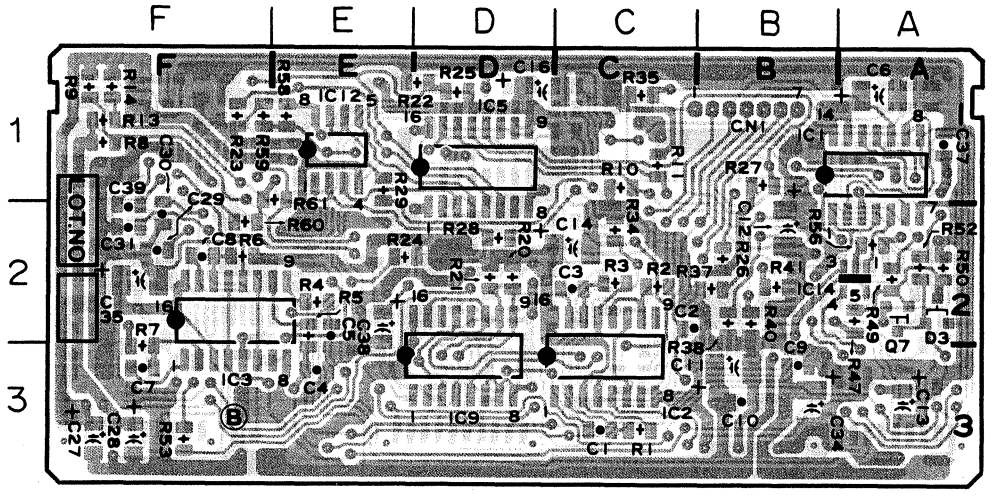
注意：
1. DC電圧はデジタル電圧計による値。
（入力インピーダンス 10MΩ）
2. 波形写真は下記条件で撮影。
   - VIDEO OUT端子にてカラーバーの白部分が100IREになるようレンズアイリスをセットする。(F ≒ 5.6)
   - WHITE BAL スイッチ→ “3200” 位置
   - GAIN スイッチ→ “0dB” 位置
3. 波形および電圧の測定の時，端子間が狭いので回路のショートには注意して下さい。
4. 基板を延長する時は，必ず電源を「OFF」の状態で行って下さい。

NOTE:
1. All voltage are dc, measured with a digital voltmeter (input resistance 10 MΩ).
2. All waveforms are taken in conditions below.
   - Shoot the color bar pattern on the pattern box.
     Adjust lens iris so that a white level at VIDEO OUT connector is 100 IRE (700 mV for PAL). [F ≒ 5.6]
   - Set the camera WHITE BAL switch to “3200”.
   - Set the camera GAIN switch to “0 dB”.
3. Since there is very narrow space between the pins, pay attention not to short-circuit when measuring the waveform and voltage.
4. When extending the board, be sure to turn OFF the power.

AT-62 BOARD



AT-62 – A SIDE –
1-637-474-11
DXC-151 (UC,J)
DXC-151P (EK)



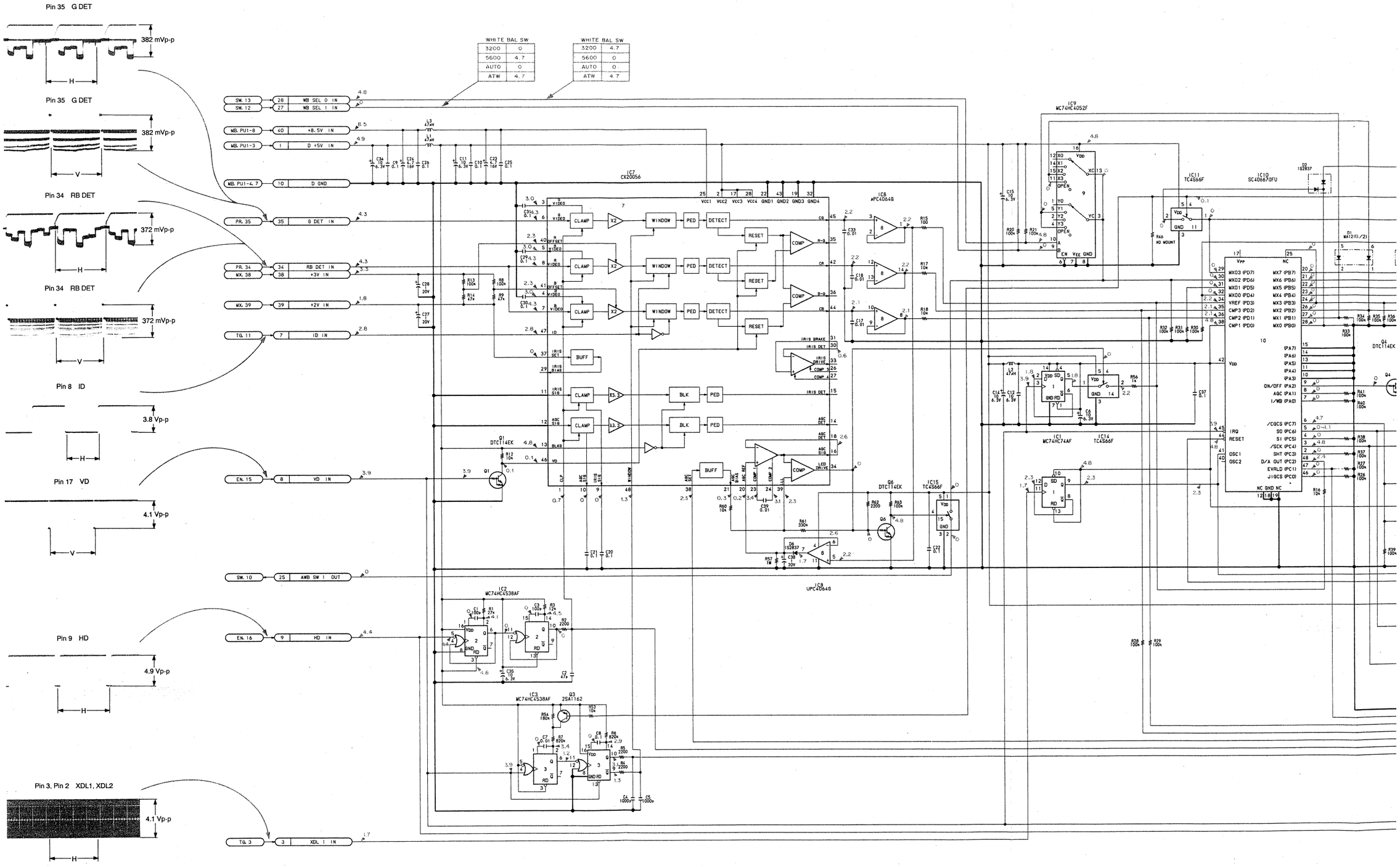
AT-62 – B SIDE –
1-637-474-11
DXC-151 (UC,J)
DXC-151P (EK)

AT-62 1-637-474-11

CN1	B-1
D1	C-1
D2	C-2
D3	* A-2
D4	C-3
D5	F-1
D6	D-2
IC1	* A-1
IC2	* C-3
IC3	* F-2
IC4	A-2
IC5	* D-1
IC6	A-1
IC7	D-2
IC8	D-1
IC9	* D-3
IC10	B-2
IC11	D-2
IC12	* E-1
IC13	F-1
IC14	* A-2
IC15	D-3
Q1	F-3
Q2	
Q3	F-3
Q4	D-2
Q5	F-1
Q6	E-2
TP1	E-1
TP2	E-1

* : B SIDE

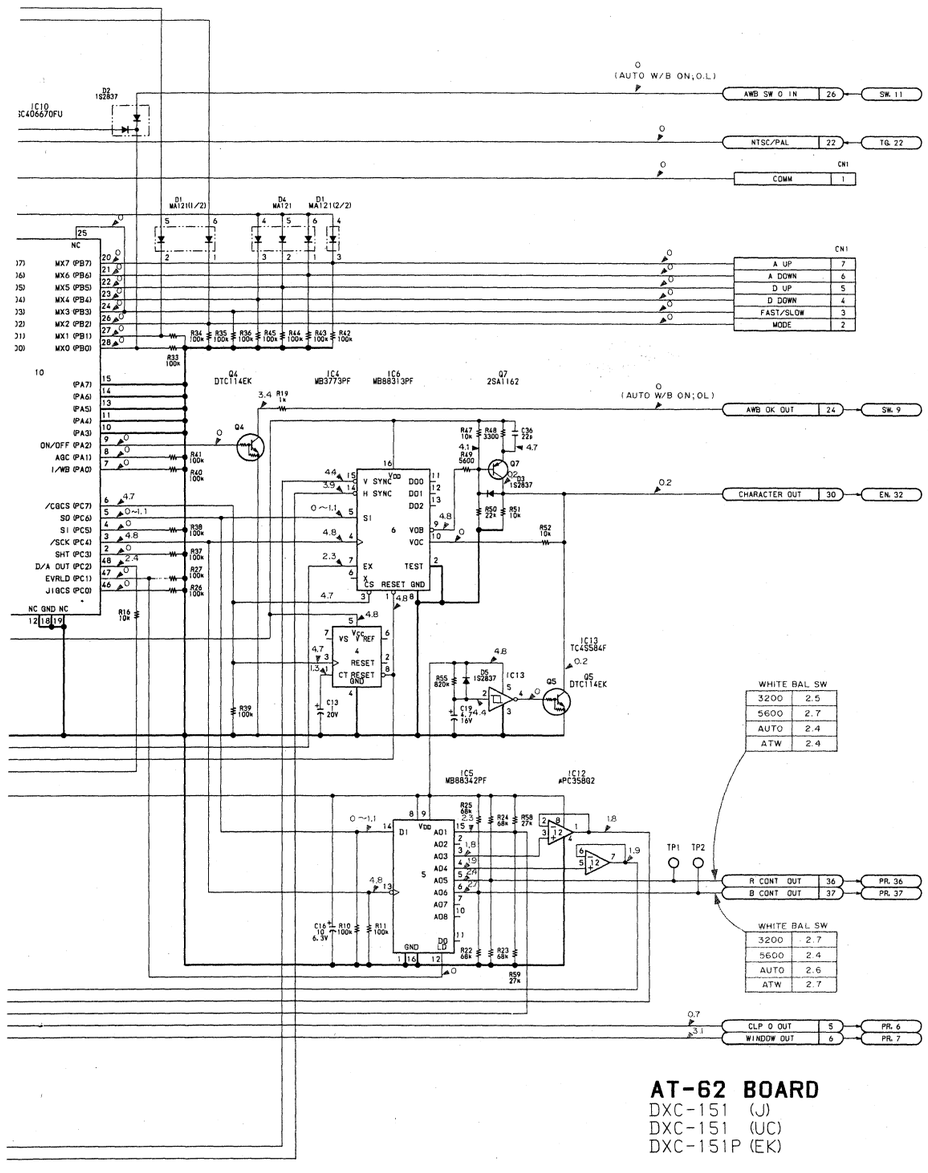
AT-62 BOARD



C-43 C-44

DXC-151 (UC, J)
DXC-151P (EK)

A | B | C | D | E | F | G | H

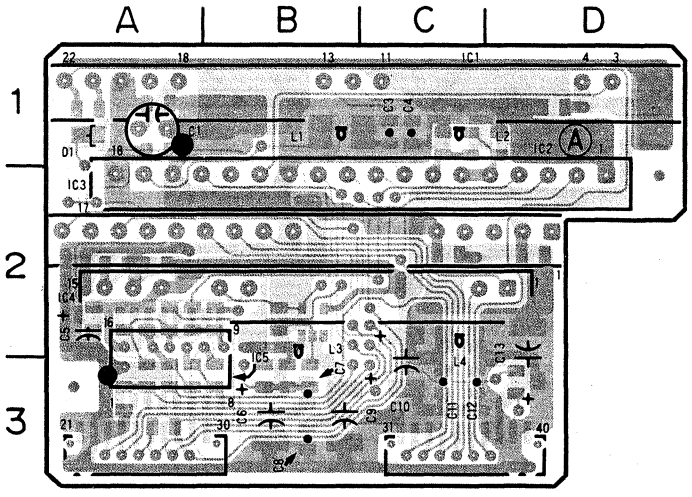


AT-62 BOARD
DXC-151 (J)
DXC-151 (UC)
DXC-151P (EK)

注意：
1. DC電圧はデジタル電圧計による値。
（入力インピーダンス 10MΩ）
2. 波形写真は下記条件で撮影。
   - VIDEO OUT端子にてカラーバーの白部分が100IREになるようレンズアイリスをセットする。（F≒5.6）
   - WHITE BALスイッチ→ “3200” 位置
   - GAINスイッチ→ “0dB” 位置
3. 波形および電圧の測定の時，端子間が狭いので回路のショートには注意して下さい。
4. 基板を延長する時は，必ず電源を「OFF」の状態で行って下さい。

NOTE:
1. All voltage are dc, measured with a digital voltmeter (inpu resistance 10 MΩ).
2. All waveforms are taken in conditions below.
   - Shoot the color bar pattern on the pattern box. Adjust lens iris so that a white level at VIDEO OUT connector is 100 IRE (700 mV for PAL). [F ≒ 5.6]
   - Set the camera WHITE BAL switch to "3200".
   - Set the camera GAIN switch to "0 dB".
3. Since there is very narrow space between the pins, pay attention not to short-circuit when measuring the waveform and voltage.
4. When extending the board, be sure to turn OFF the power.

SG-177/177P BOARD

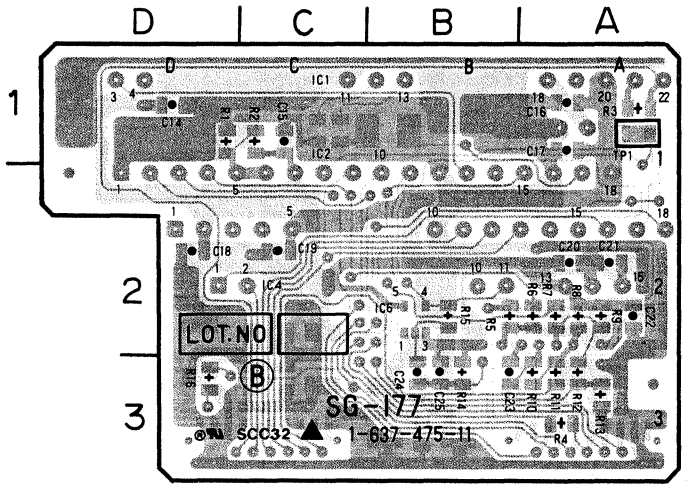


SG-177/177P – A SIDE –
1-637-472-11
DXC-151 (UC,J)
DXC-151P (EK)

SG-177/177P 1-637-475-11

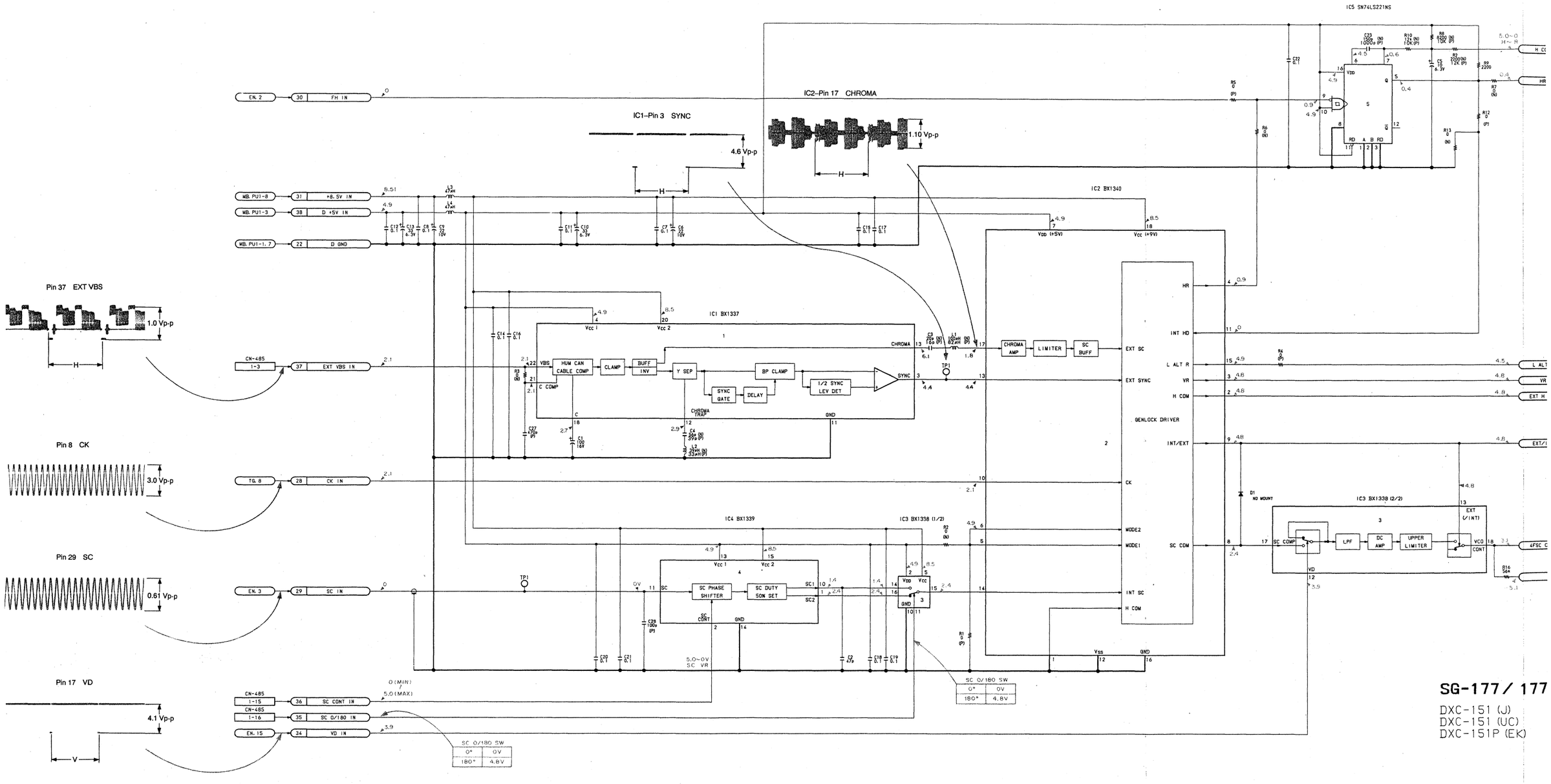
IC1	A-1
IC2	A-1
IC3	A-2
IC4	A-2
IC5	A-2
IC6	* B-2
TP1	* A-1

* : B SIDE



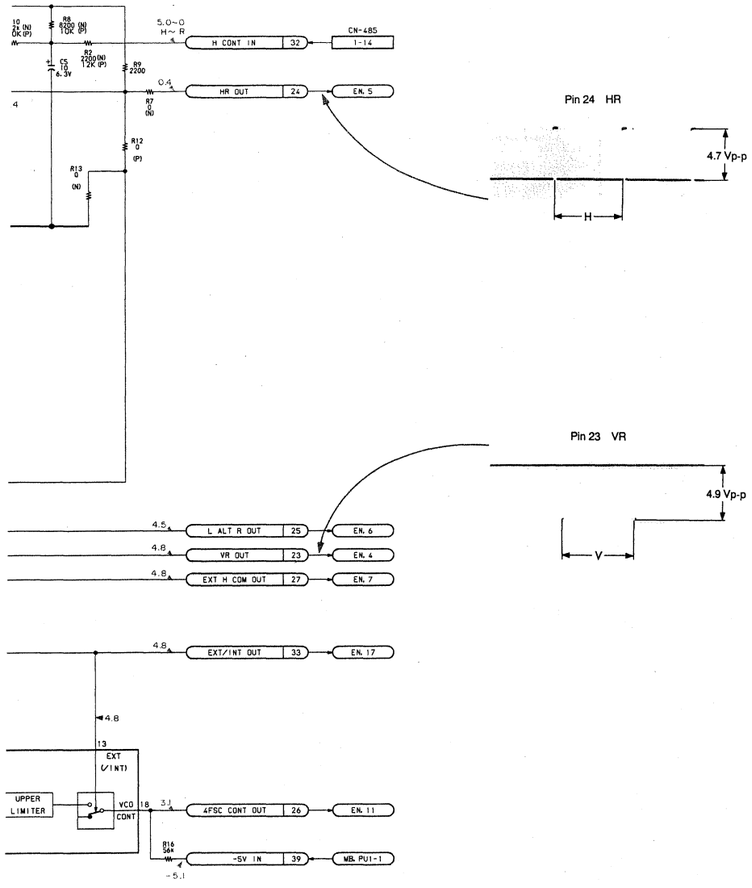
SG-177/177P – B SIDE –
1-637-472-11
DXC-151 (UC,J)
DXC-151P (EK)

SG-177/177P BOARD



SG-177 / 177

DXC-151 (J)
DXC-151 (UC)
DXC-151P (EK)



SG-177/177P BOARD

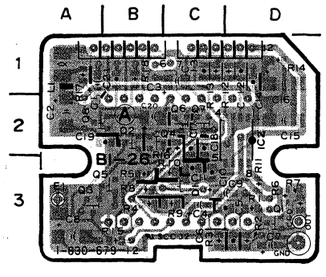
DXC-151 (J)
DXC-151 (UC)
DXC-151P (EK)

注意：
1. DC電圧はデジタル電圧計による値。
   （入力インピーダンス 10MΩ）
2. 波形写真はGENLOCK IN端子よりカラーバー信号を入力する。
3. 波形および電圧の測定の時，端子間が狭いので回路のショートには注意して下さい。
4. 基板を延長する時は，必ず電源を「OFF」の状態で行って下さい。

NOTE:
1. All voltage are dc, measured with a digital voltmeter (input resistance 10 MΩ).
2. All waveforms are taken in conditions below.
   - Supply a color bar signal to the GENLOCK connector.
3. Since there is very narrow space between the pins, pay attention not to short-circuit when measuring the waveform and voltage.
4. When extending the board, be sure to turn OFF the power.

FRAME WIRING BI-26, CN-485, MB-320, SW-439/439P

BI-26 BOARD

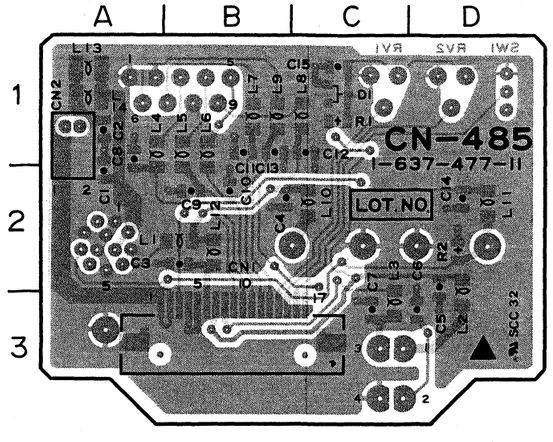


BI-26 – A SIDE –
1-630-679-12
DXC-151 (UC,J)
DXC-151P (EK)

BI-26 1-630-679-11

D1	B-1
IC2	B-1
Q1	B-1
Q2	A-1
Q3	A-1
Q4	A-1
Q5	A-1
Q6	B-1
Q7	B-1
Q8	A-1

CN-485 BOARD



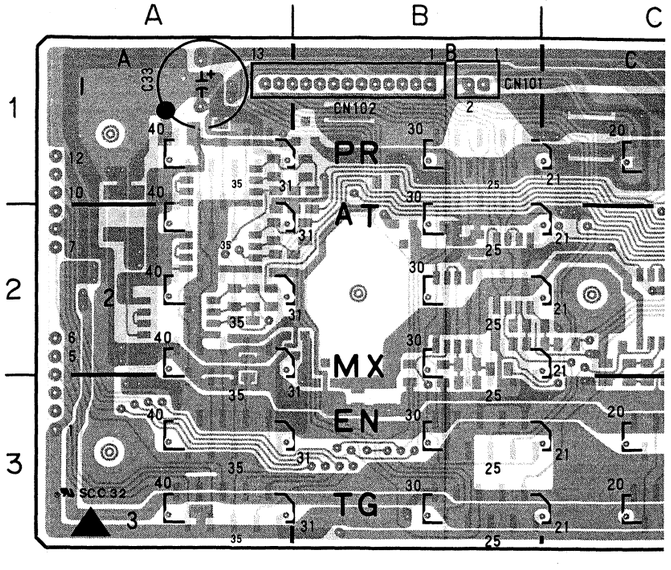
CN-485 – A SIDE –
1-637-477-11
DXC-151 (UC,J)
DXC-151P (EK)

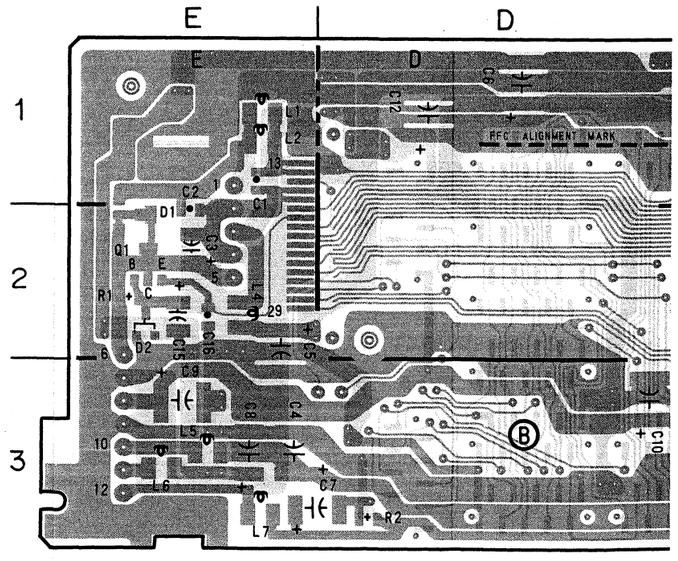
CN-485 1-637-477-11

CN1	B3
CN2	A-1
D1	C-1
RV1	* C-1
RV2	* D-1
SW1	* D-1

* : B SIDE

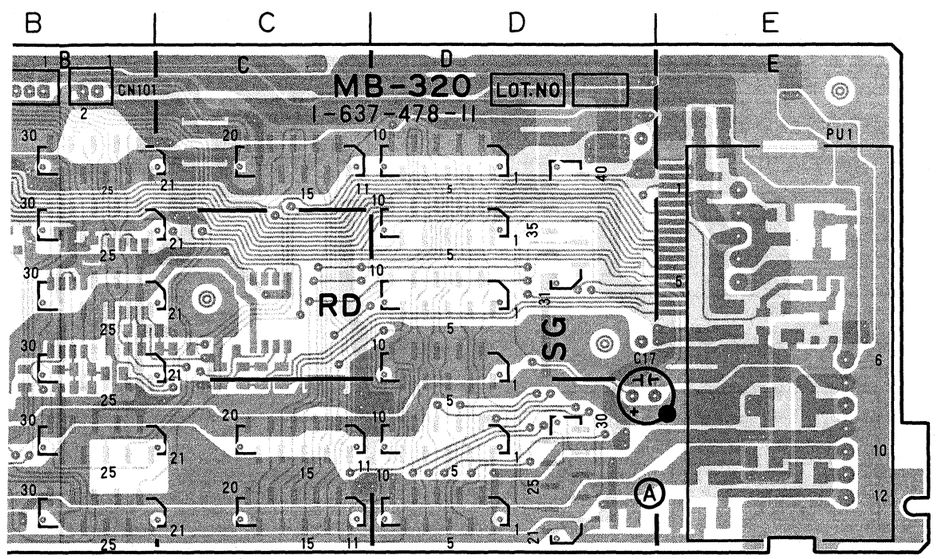
MB-320 BOARD





FRAME WIRING BI-26, CN-485, MB-320, SW-439/439P

SW-439/439P BOARD

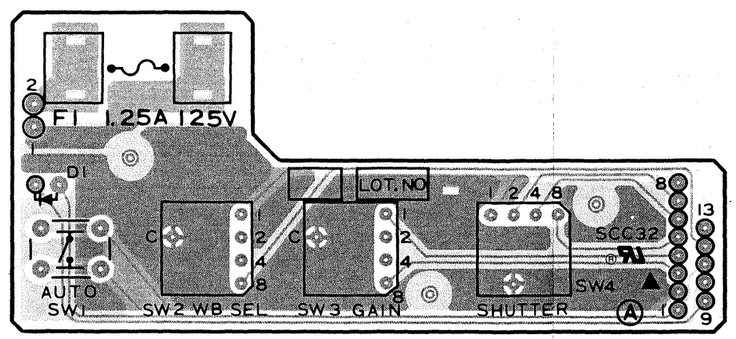


MB-320 – A SIDE –
1-637-478-11
DXC-151 (UC,J)
DXC-151P (EK)

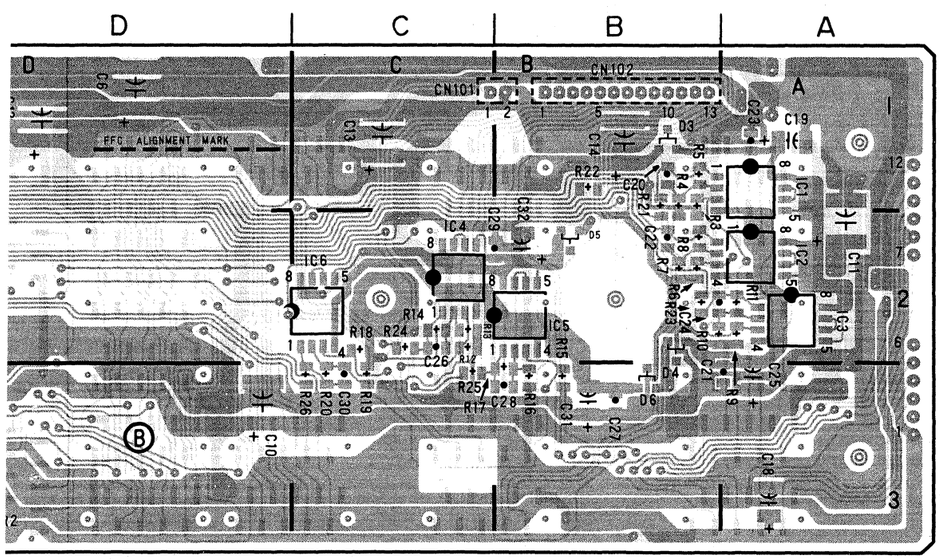
MB-320 1-637-478-11

CN101	B-1
CN102	B-1
D1	* E-2
D2	* E-2
D3	* A-1
D4	* B-2
D5	* B-2
D6	* B-3
IC1	* A-1
IC2	* A-2
IC3	* A-2
IC4	* C-2
IC5	* B-2
IC6	* C-2
PU1	E-2
Q1	* E-2

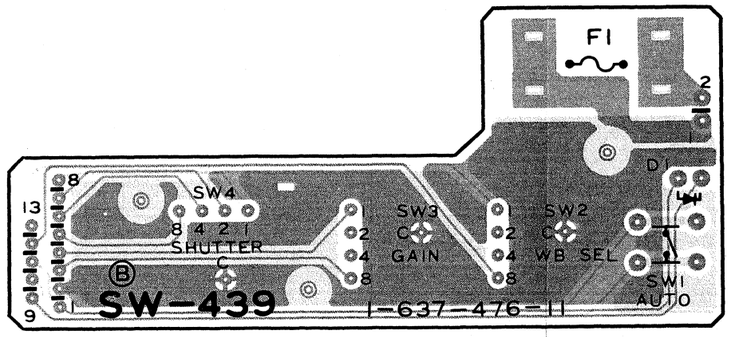
* : B SIDE



SW-439/439P – A SIDE –
1-637-476-11
DXC-151 (UC,J)
DXC-151P (EK)



MB-320 – B SIDE –
1-637-478-11
DXC-151 (UC,J)
DXC-151P (EK)



SW-439/439P – B SIDE –
1-637-476-11
DXC-151 (UC,J)
DXC-151P (EK)

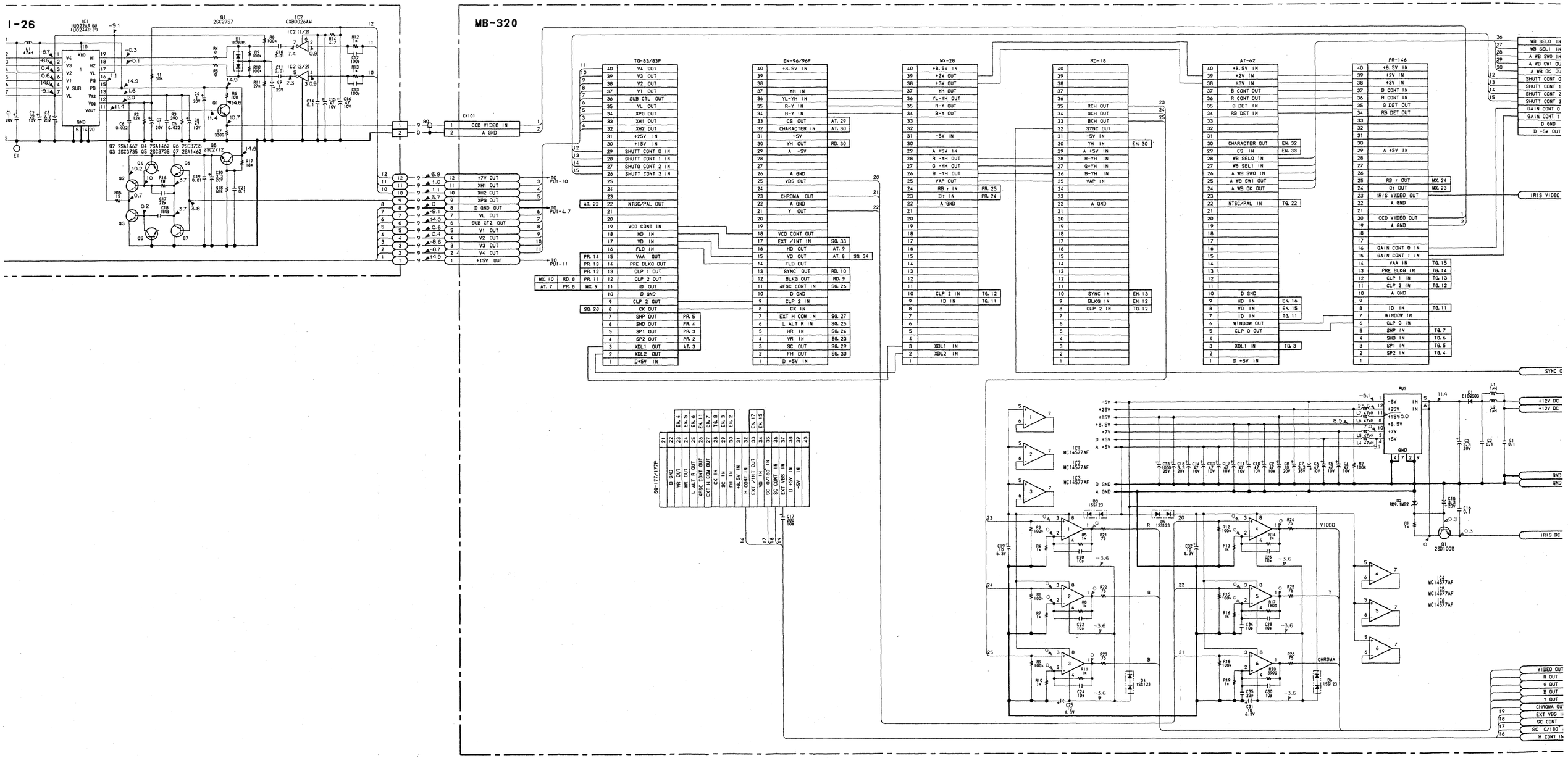
AME WIRING

I-26 BOARD

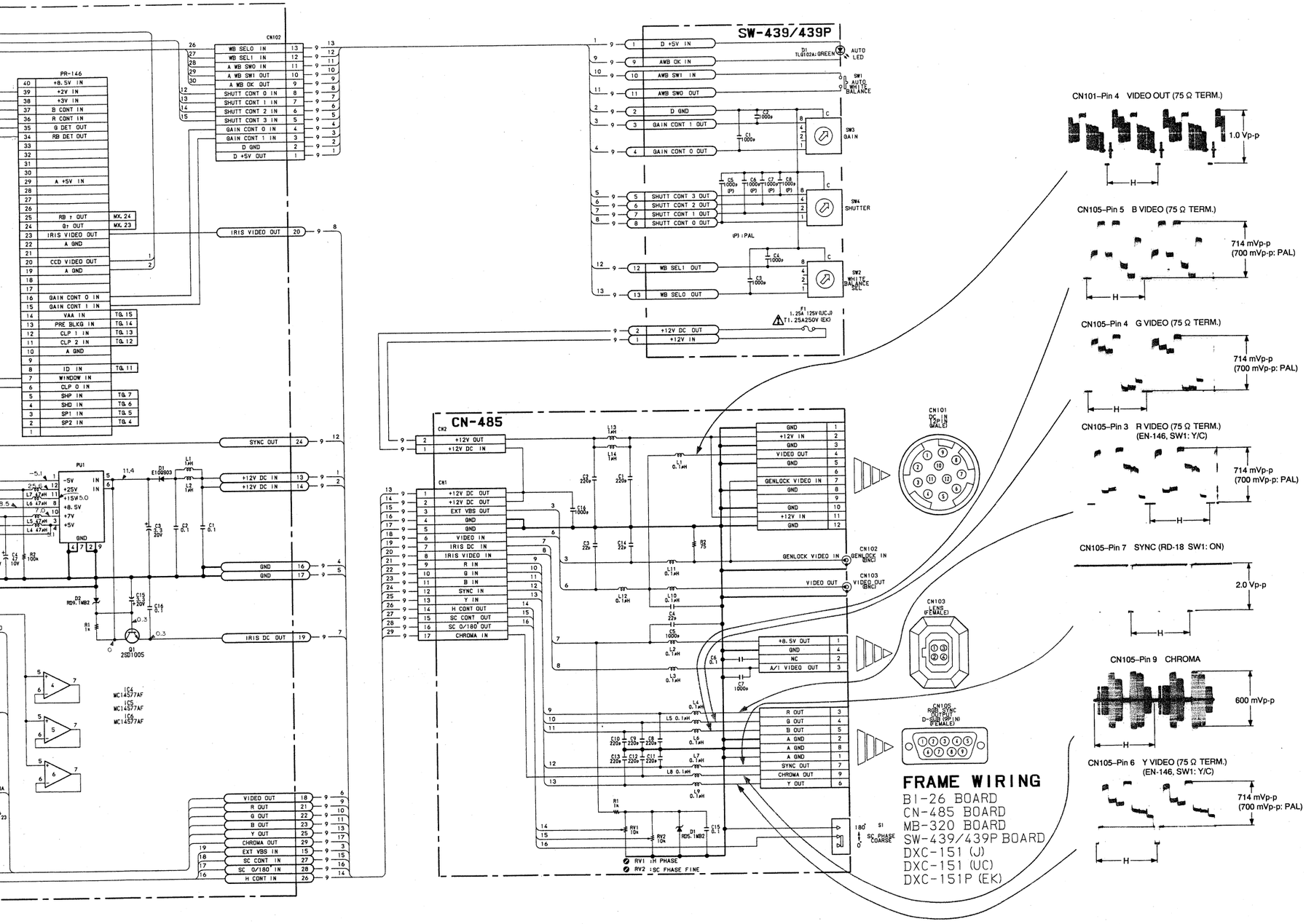
:N-485 BOARD

1B-320 BOARD

:W-439/439P BOARD



FRAME WIRING BI-26, CN-485, MB-320, SW-439/439P



CN101–Pin 4 VIDEO OUT (75 Ω TERM.)

CN105–Pin 5 B VIDEO (75 Ω TERM.)

CN105–Pin 4 G VIDEO (75 Ω TERM.)

CN105–Pin 3 R VIDEO (75 Ω TERM.)
(EN-146, SW1: Y/C)

CN105–Pin 7 SYNC (RD-18 SW1: ON)

CN105–Pin 9 CHROMA

CN105–Pin 6 Y VIDEO (75 Ω TERM.)
(EN-146, SW1: Y/C)

注意：

1. DC電圧はデジタル電圧計による値。
   (入力インピーダンス 10MΩ)
2. 波形写真は下記条件で撮影。
   - VIDEO OUT端子にてカラーバーの白部分が100IREになるようレンズアイリスをセットする。(F ≒ 5.6)
   - WHITE BALスイッチ→ “3200” 位置
   - GAINスイッチ→ “0dB” 位置
3. 波形および電圧の測定の時，端子間が狭いので回路のショートには注意して下さい。
4. 基板を延長する時は，必ず電源を「OFF」の状態で行って下さい。
5. ⚠印の部品は安全性を維持するために重要な部品です。従って交換する時は必ず指定の部品を使って下さい。

NOTE:

1. All voltage are dc, measured with a digital voltmeter (input resistance 10 MΩ).
2. All waveforms are taken in conditions below.
   - Shoot the color bar pattern on the pattern box.
     Adjust lens iris so that a white level at VIDEO OUT connector is 100 IRE (700 mV for PAL). [F ≒ 5.6]
   - Set the camera WHITE BAL switch to “3200”.
   - Set the camera GAIN switch to “0 dB”.
3. Since there is very narrow space between the pins, pay attention not to short-circuit when measuring the waveform and voltage.
4. When extending the board, be sure to turn OFF the power.
5. The ⚠ marked components are critical to safety. Replace only with same components as specified.

SECTION D
SPARE PARTS

PARTS INFORMATION

1. **Safety Related Component Warning**

   Components identified by shading marked with ⚠ on the schematic diagrams, exploded views and electrical spare parts list are critical to safe operation. Replace these components with Sony parts whose parts numbers appear as shown in this manual or in service manual supplements published by Sony.

2. Replace parts that are supplied from Sony Parts Center can sometimes have different shape and external appearance than what are actually used in equipment. This is due to"accommodating the improved parts and/or engineering changes" or"standardization of genuine parts."
   - This manual's exploded view and electrical spare parts lists are indicating the parts numbers of "the standardized genuine parts at present."
   - Regarding engineering parts and diagrams changes in our engineering department, refer to Sony service bulletins and service manual supplements.

3. The parts marked with"S" in the SP column of the exploded views and electrical spare parts list are normally required for routine service work. Orders for parts marked with "O" will be processed, but allow for additional delivery time.

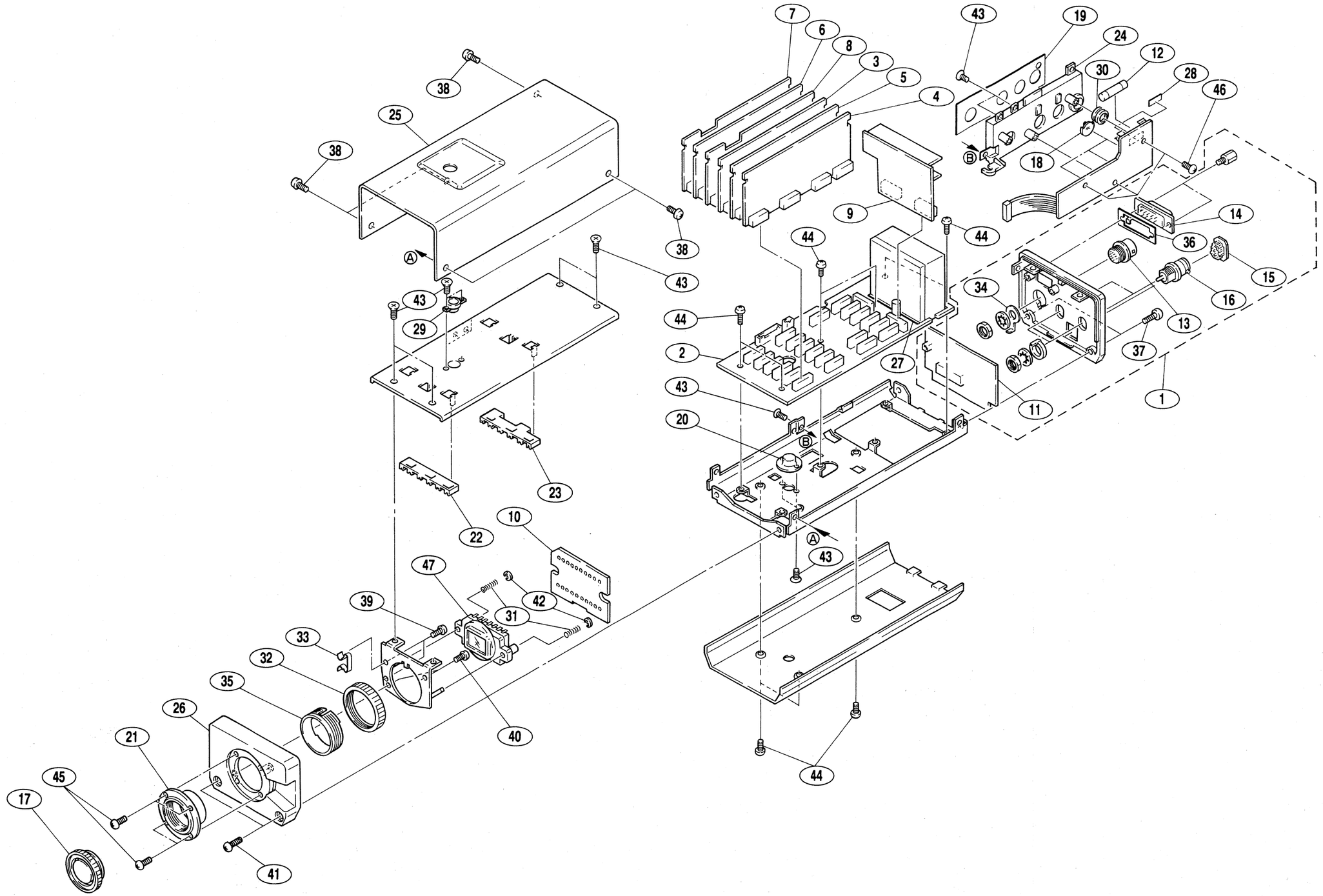
4. Item with no parts number and/or no description are not stocked because they are seldom required for routine service.

5. **Abbreviation**

   All capacitors are in micro farads unless otherwise specified.
   All inductors are in micro henries unless otherwise specified.
   All resistors are in ohms.

EXPLODED VIEW

No.	Part No.	SP	Description
1	A-7420-194-A	o	PANEL SUB ASSY, REAR
2	A-7515-244-A	o	MOUNTED CIRCUIT BOARD, MB-320
3	A-7515-245-A	o	MOUNTED CIRCUIT BOARD, MX-28
4	A-7515-246-A	o	MOUNTED CIRCUIT BOARD, TG-83 (DXC-151)
	A-7515-252-A	o	MOUNTED CIRCUIT BOARD, TG-83P (DXC-151P)
5	A-7515-247-A	o	MOUNTED CIRCUIT BOARD, EN-96 (DXC-151)
	A-7515-253-A	o	MOUNTED CIRCUIT BOARD, EN-96P (DXC-151P)
6	A-7515-248-A	o	MOUNTED CIRCUIT BOARD, AT-62
7	A-7515-249-A	o	MOUNTED CIRCUIT BOARD, PR-146
8	A-7515-250-A	o	MOUNTED CIRCUIT BOARD, RD-18
9	A-7515-251-A	o	MOUNTED CIRCUIT BOARD, SG-177 (DXC-151)
	A-7515-254-A	o	MOUNTED CIRCUIT BOARD, SG-177P (DXC-151P)
10	A-7520-429-A	o	MOUNTED CIRCUIT BOARD, BI-26
11	A-7520-530-A	o	MOUNTED CIRCUIT BOARD, CN-485
12 ⚠	1-532-285-00	s	FUSE, TIME-LAG 1.25A (DXC-151P)
⚠	1-532-741-11	s	FUSE, GLASS TUBE 1.25A (DXC-151)
13	1-562-381-00	s	CONNECTOR, ROUND TYPE 12P
14	1-580-090-11	s	SOCKET, D-SUB CONNECTOR 9P
15	1-580-172-11	s	CONNECTOR, MICRO (RECEPTACLE) 4P
16	1-580-724-11	s	CONNECTOR, BNC
17	2-042-385-00	s	CAP, C MOUNT
18	3-167-311-01	s	KNOB
19	3-167-312-01	o	LABEL
20	3-167-313-01	o	SCREW (B), TRIPOD
21	3-167-315-01	o	MOUNT, C
22	3-167-318-01	s	RETAINER (B), PC BOARD
23	3-167-319-01	s	RETAINER (A), PC BOARD
24	3-167-320-01	o	PANEL, SWITCH
25	3-167-323-01	o	COVER
26	3-167-325-01	o	PANEL, FRONT
27	3-167-756-01	s	SHEET, INSULATING, DD
28	3-168-700-01	o	LABEL, FUSE RATING (DXC-151P)
29	3-670-518-00	o	SCREW, TRIPOD
30	3-676-244-00	s	COVER, SWITCH
31	3-698-802-01	o	SPRING, COMPRESSION
32	3-698-814-01	o	RING, ADJUSTMENT
33	3-715-187-01	o	SPRING (B), PLATE
34	3-718-804-01	o	LUG, GROUND
35	3-737-502-01	o	RING, SLIDE
36	3-737-536-01	o	LUG, GROUND, CONNECTOR
37	7-621-259-55	s	SCREW +P 2.6X8
38	7-621-772-10	s	SCREW +B 2X4
39	7-621-772-50	s	SCREW +B 2X10
40	7-621-773-95	s	SCREW +B 2.6X6
41	7-621-775-70	s	SCREW +B 2.6X14
42	7-624-102-04	s	STOP RING 1.5, TYPE -E
43	7-627-452-28	s	SCREW, PRECISION +K 2X4
44	7-627-553-48	s	SCREW, PRECISION +P 2X4
45	7-627-556-08	s	SCREW +P 2.6X2.8
46	7-685-104-19	s	SCREW +P 2X6 TYPE2 NON-SLIT
47	8-750-013-08	s	IU022AR-10C (DXC-151)
	8-753-013-09	s	IU024AR-10C (DXC-151P)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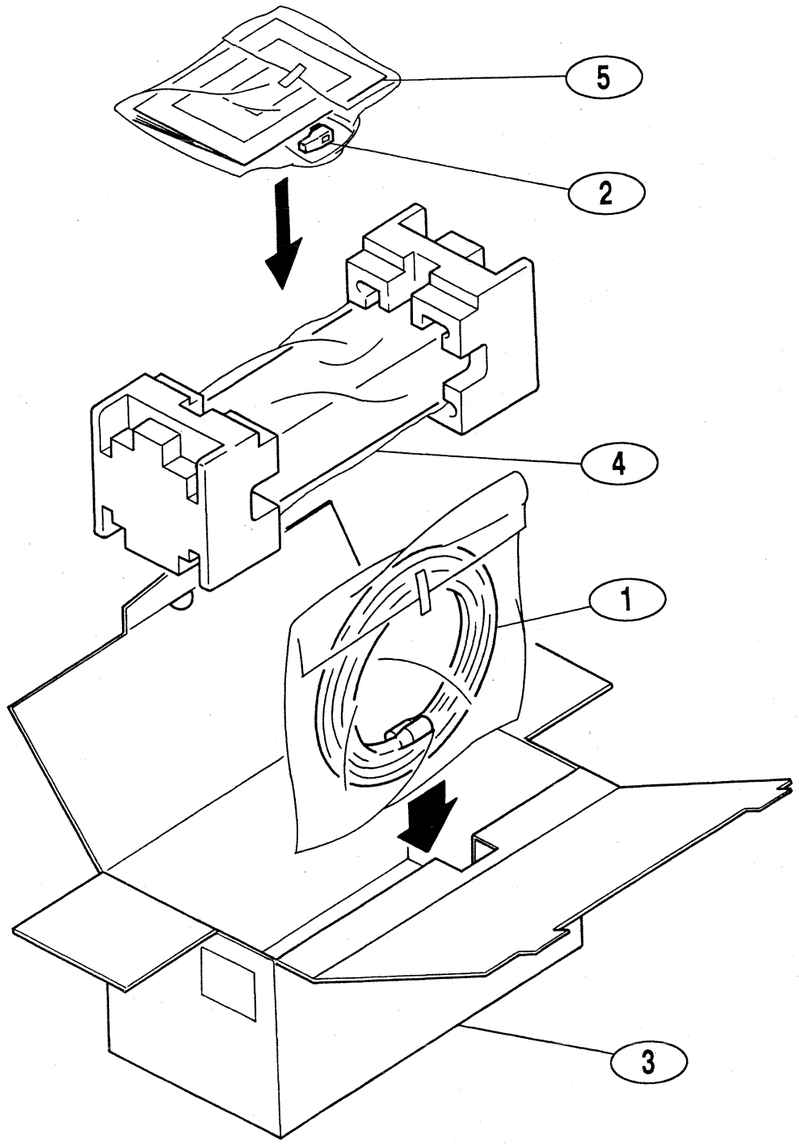
No.	Part No.	SP	Description
1	1-557-668-51	s	CABLE, DC POWER (4 CORE)
2	1-580-173-11	s	CONNECTOR, MICRO (PLUG) 4P
3	3-168-377-01	o	INDIVIDUAL CARTON (DXC-151)
	3-168-378-01	o	INDIVIDUAL CARTON (DXC-151P)
4	3-701-623-00	s	BAG, POLYETHYLENE
5	3-752-644-11	s	MANUAL, INSTRUCTION



ELECTRICAL PARTS LIST

RESISTOR, CHIP

Part No.	SP	Description
1-216-295-00	s	RES, CHIP 0 5% 1/10W
1-216-298-00	s	RES, CHIP 2.2 5% 1/10W
1-216-302-00	s	RES, CHIP 2.7 5% 1/10W
1-216-304-11	s	RES, CHIP 3.3 5% 1/10W
1-216-306-11	s	RES, CHIP 3.9 5% 1/10W
1-216-308-00	s	RES, CHIP 4.7 5% 1/10W
1-216-309-00	s	RES, CHIP 5.6 5% 1/10W
1-216-311-00	s	RES, CHIP 6.8 5% 1/10W
1-216-313-00	s	RES, CHIP 8.2 5% 1/10W
1-216-001-00	s	RES, CHIP 10 5% 1/10W
1-216-003-11	s	RES, CHIP 12 5% 1/10W
1-216-005-00	s	RES, CHIP 15 5% 1/10W
1-216-007-00	s	RES, CHIP 18 5% 1/10W
1-216-009-00	s	RES, CHIP 22 5% 1/10W
1-216-011-00	s	RES, CHIP 27 5% 1/10W
1-216-013-00	s	RES, CHIP 33 5% 1/10W
1-216-015-00	s	RES, CHIP 39 5% 1/10W
1-216-017-00	s	RES, CHIP 47 5% 1/10W
1-216-019-00	s	RES, CHIP 56 5% 1/10W
1-216-021-00	s	RES, CHIP 68 5% 1/10W
1-216-023-00	s	RES, CHIP 82 5% 1/10W
1-216-025-00	s	RES, CHIP 100 5% 1/10W
1-216-027-00	s	RES, CHIP 120 5% 1/10W
1-216-029-00	s	RES, CHIP 150 5% 1/10W
1-216-031-00	s	RES, CHIP 180 5% 1/10W
1-216-033-00	s	RES, CHIP 220 5% 1/10W
1-216-035-00	s	RES, CHIP 270 5% 1/10W
1-216-037-00	s	RES, CHIP 330 5% 1/10W
1-216-039-00	s	RES, CHIP 390 5% 1/10W
1-216-041-00	s	RES, CHIP 470 5% 1/10W
1-216-043-00	s	RES, CHIP 560 5% 1/10W
1-216-045-00	s	RES, CHIP 680 5% 1/10W
1-216-047-00	s	RES, CHIP 820 5% 1/10W
1-216-049-00	s	RES, CHIP 1k 5% 1/10W
1-216-051-00	s	RES, CHIP 1.2k 5% 1/10W
1-216-053-00	s	RES, CHIP 1.5k 5% 1/10W
1-216-055-00	s	RES, CHIP 1.8k 5% 1/10W
1-216-057-00	s	RES, CHIP 2.2k 5% 1/10W
1-216-059-00	s	RES, CHIP 2.7k 5% 1/10W
1-216-061-00	s	RES, CHIP 3.3k 5% 1/10W
1-216-063-00	s	RES, CHIP 3.9k 5% 1/10W
1-216-065-00	s	RES, CHIP 4.7k 5% 1/10W
1-216-067-00	s	RES, CHIP 5.6k 5% 1/10W
1-216-069-00	s	RES, CHIP 6.8k 5% 1/10W
1-216-071-00	s	RES, CHIP 8.2k 5% 1/10W
1-216-073-00	s	RES, CHIP 10k 5% 1/10W
1-216-075-00	s	RES, CHIP 12k 5% 1/10W
1-216-077-00	s	RES, CHIP 15k 5% 1/10W
1-216-079-00	s	RES, CHIP 18k 5% 1/10W
1-216-081-00	s	RES, CHIP 22k 5% 1/10W
1-216-083-00	s	RES, CHIP 27k 5% 1/10W
1-216-085-00	s	RES, CHIP 33k 5% 1/10W
1-216-748-11	s	RES, CHIP 39k 5% 1/10W
1-216-089-00	s	RES, CHIP 47k 5% 1/10W
1-216-091-00	s	RES, CHIP 56k 5% 1/10W

RESISTOR, CHIP

Part No.	SP	Description
1-216-093-00	s	RES, CHIP 68k 5% 1/10W
1-216-095-00	s	RES, CHIP 82k 5% 1/10W
1-216-097-00	s	RES, CHIP 100k 5% 1/10W
1-216-099-00	s	RES, CHIP 120k 5% 1/10W
1-216-101-00	s	RES, CHIP 150k 5% 1/10W
1-216-103-00	s	RES, CHIP 180k 5% 1/10W
1-216-105-00	s	RES, CHIP 220k 5% 1/10W
1-216-107-00	s	RES, CHIP 270k 5% 1/10W
1-216-109-00	s	RES, CHIP 330k 5% 1/10W
1-216-111-00	s	RES, CHIP 390k 5% 1/10W
1-216-113-00	s	RES, CHIP 470k 5% 1/10W
1-216-115-00	s	RES, CHIP 560k 5% 1/10W
1-216-117-00	s	RES, CHIP 680k 5% 1/10W
1-216-119-00	s	RES, CHIP 820k 5% 1/10W
1-216-121-00	s	RES, CHIP 1.0M 5% 1/10W
1-216-123-11	s	RES, CHIP 1.2M 5% 1/10W
1-216-125-00	s	RES, CHIP 1.5M 5% 1/10W
1-216-127-11	s	RES, CHIP 1.8M 5% 1/10W
1-216-129-00	s	RES, CHIP 2.2M 5% 1/10W
1-216-131-11	s	RES, CHIP 2.7M 5% 1/10W
1-216-133-00	s	RES, CHIP 3.3M 5% 1/10W

CAPACITOR, CHIP CERAMIC

Part No.	SP	Description
1-163-083-00	s	CAP, CHIP CERAMIC 1pF +-0.25pF 50V
1-163-085-00	s	CAP, CHIP CERAMIC 2pF +-0.25pF 50V
1-163-087-00	s	CAP, CHIP CERAMIC 4pF +-0.25pF 50V
1-163-089-00	s	CAP, CHIP CERAMIC 6pF +-0.5pF 50V
1-163-091-00	s	CAP, CHIP CERAMIC 8pF +-0.5pF 50V
1-163-093-00	s	CAP, CHIP CERAMIC 10pF 5% 50V
1-163-097-00	s	CAP, CHIP CERAMIC 15pF 5% 50V
1-163-101-00	s	CAP, CHIP CERAMIC 22pF 5% 50V
1-163-105-00	s	CAP, CHIP CERAMIC 33pF 5% 50V
1-163-109-00	s	CAP, CHIP CERAMIC 47pF 5% 50V
1-163-113-00	s	CAP, CHIP CERAMIC 68pF 5% 50V
1-163-117-00	s	CAP, CHIP CERAMIC 100pF 5% 50V
1-163-121-00	s	CAP, CHIP CERAMIC 150pF 5% 50V
1-163-125-00	s	CAP, CHIP CERAMIC 220pF 5% 50V
1-163-129-00	s	CAP, CHIP CERAMIC 330pF 5% 50V
1-163-133-00	s	CAP, CHIP CERAMIC 470pF 5% 50V
1-163-137-00	s	CAP, CHIP CERAMIC 680pF 5% 50V
1-163-141-00	s	CAP, CHIP CERAMIC 1000pF 5% 50V
1-163-145-00	s	CAP, CHIP CERAMIC 1500pF 10% 50V
1-164-161-11	s	CAP, CHIP CERAMIC 2200pF 10% 100V
1-164-182-11	s	CAP, CHIP CERAMIC 3300pF 10% 100V
1-163-017-00	s	CAP, CHIP CERAMIC 4700pF 10% 50V
1-163-019-00	s	CAP, CHIP CERAMIC 6800pF 10% 50V
1-164-232-11	s	CAP, CHIP CERAMIC 0.01 20% 100V
1-163-023-00	s	CAP, CHIP CERAMIC 0.015 10% 50V
1-163-034-00	s	CAP, CHIP CERAMIC 0.033 50V
1-163-035-00	s	CAP, CHIP CERAMIC 0.047 50V
1-163-036-00	s	CAP, CHIP CERAMIC 0.068 50V
1-163-038-00	s	CAP, CHIP CERAMIC 0.1 50V

AT-62 BOARD

Ref. No. or Q'ty	Part No.	SP	Description
1pc	A-7515-248-A	o	MOUNTED CIRCUIT BOARD, AT-62
3pcs	1-568-351-11	o	CONNECTOR, BOARD TO BOARD 10P
C1	1-163-251-11	s	CERAMIC 100PF 5% 50V
C3	1-163-251-11	s	CERAMIC 100PF 5% 50V
C4	1-163-009-11	s	CERAMIC, CHIP 0.001uF 10% 50V
C5	1-163-009-11	s	CERAMIC, CHIP 0.001uF 10% 50V
C6	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C11	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C12	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C13	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C14	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C15	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C16	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C19	1-135-155-21	s	TANTAL CHIP 4.7uF 10% 16V
C23	1-135-155-21	s	TANTAL CHIP 4.7uF 10% 16V
C24	1-135-155-21	s	TANTAL CHIP 4.7uF 10% 16V
C27	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C28	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C34	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C35	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C36	1-163-235-11	s	CERAMIC 22PF 5% 50V
C38	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
CN1	1-565-879-11	s	CONNECTOR (PC BOARD) 7P, MALE
D1	8-719-404-40	s	DIODE MA121
D2	8-719-400-18	s	DIODE MA152WK
D3	8-719-400-18	s	DIODE MA152WK
D4	8-719-404-40	s	DIODE MA121
D5	8-719-400-18	s	DIODE MA152WK
D6	8-719-400-18	s	DIODE MA152WK
IC1	8-759-032-23	s	IC MC74HC74AF
IC2	8-759-008-45	s	IC MC74HC4538F
IC3	8-759-008-45	s	IC MC74HC4538F
IC4	8-759-988-82	s	IC MB3773PF
IC5	8-759-977-80	s	IC MB88342PF
IC6	8-759-942-27	s	IC MB88313PF
IC7	8-759-933-28	s	IC CX20056
IC8	8-759-147-21	s	IC UPC4064G2
IC9	8-759-011-64	s	IC MC74HC4052F
IC10	8-759-038-37	s	IC MC68HC05N4-SC406670FU
IC11	8-759-234-77	s	IC TC4S66F
IC12	8-759-100-94	s	IC UPC358G2
IC13	8-759-245-04	s	IC TC4S584F
IC14	8-759-234-77	s	IC TC4S66F
IC15	8-759-234-77	s	IC TC4S66F
L1	1-412-031-11	s	INDUCTOR CHIP 47uH
L2	1-412-031-11	s	INDUCTOR CHIP 47uH
L3	1-412-031-11	s	INDUCTOR CHIP 47uH
Q1	8-729-900-53	s	TRANSISTOR DTC114EK
Q3	8-729-216-22	s	TRANSISTOR 2SA1162
Q4	8-729-900-53	s	TRANSISTOR DTC114EK
Q5	8-729-900-53	s	TRANSISTOR DTC114EK
Q6	8-729-900-53	s	TRANSISTOR DTC114EK
Q7	8-729-216-22	s	TRANSISTOR 2SA1162

BI-26 BOARD

Ref. No. or Q'ty	Part No.	SP	Description
1pc	A-7520-429-A	o	MOUNTED CIRCUIT BOARD, BI-26
1pc	1-563-936-11	o	HOUSING, CONNECTOR 2P
1pc	1-563-940-11	s	CONTACT, FEMALE
2pcs	1-574-867-11	o	WIRE, PVC (FLAT TYPE)(6 CORE)
C1	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C2	1-135-164-21	s	TANTAL 22uF 20% 10V
C3	1-135-153-21	s	TANTAL 2.2uF 10% 25V
C4	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C5	1-163-033-00	s	CERAMIC, CHIP 0.022uF 50V
C6	1-163-033-00	s	CERAMIC, CHIP 0.022uF 50V
C7	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C8	1-135-166-21	s	TANTALUM, CHIP 47uF 10% 10V
C9	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C12	1-163-251-11	s	CERAMIC 100PF 5% 50V
C13	1-163-251-11	s	CERAMIC 100PF 5% 50V
C15	1-135-166-21	s	TANTALUM, CHIP 47uF 10% 10V
C16	1-135-166-21	s	TANTALUM, CHIP 47uF 10% 10V
C17	1-163-235-11	s	CERAMIC 22PF 5% 50V
C18	1-163-123-00	s	CERAMIC 180PF 5% 50V
C20	1-135-154-21	s	TANTAL 3.3uF 20% 20V
D1	8-719-104-34	s	DIODE 1S2836
IC1	8-750-013-08	s	IC IU022AR-10C (DXC-151)
IC1	8-750-013-09	s	IC IU024AR-10C (DXC-151P)
IC2	8-759-013-02	s	IC CXB0026AM
L1	1-410-713-31	s	INDUCTOR, CHIP 47uH
Q1	8-729-175-73	s	TRANSISTOR 2SC2757
Q2	8-729-112-65	s	TRANSISTOR 2SA1462
Q3	8-729-140-47	s	TRANSISTOR 2SC3735-L-B35
Q4	8-729-112-65	s	TRANSISTOR 2SA1462
Q5	8-729-140-47	s	TRANSISTOR 2SC3735-L-B35
Q6	8-729-140-47	s	TRANSISTOR 2SC3735-L-B35
Q7	8-729-112-65	s	TRANSISTOR 2SA1462
Q8	8-729-271-22	s	TRANSISTOR 2SC2712-G
R1	1-216-084-00	s	METAL 30K 5% 1/10W

Please see page D-6 for the part number of capacitors and resistors that are not listed in the parts list.

CN-485 BOARD

Ref. No. or Q'ty	Part No.	SP	Description
1pc	A-7520-530-A	o	PRINTED CIRCUIT BOARD, CN-485
C3	1-163-235-11	s	CERAMIC 22PF 5% 50V
C4	1-163-235-11	s	CERAMIC 22PF 5% 50V
C5	1-163-009-11	s	CERAMIC, CHIP 0.001uF 10% 50V
C7	1-163-009-11	s	CERAMIC, CHIP 0.001uF 10% 50V
C14	1-163-235-11	s	CERAMIC 22PF 5% 50V
CN1	1-566-533-11	o	CONNECTOR, FPC (ZIF) 17P
CN2	1-566-426-11	s	PIN, CONNECTOR 2P
D1	8-719-105-82	s	DIODE RD5.1M-B2
L1	1-410-180-51	s	INDUCTOR CHIP 0.1UH
L2	1-410-180-51	s	INDUCTOR CHIP 0.1UH
L3	1-410-180-51	s	INDUCTOR CHIP 0.1UH
L4	1-410-180-51	s	INDUCTOR CHIP 0.1UH
L5	1-410-180-51	s	INDUCTOR CHIP 0.1UH
L6	1-410-180-51	s	INDUCTOR CHIP 0.1UH
L7	1-410-180-51	s	INDUCTOR CHIP 0.1UH
L8	1-410-180-51	s	INDUCTOR CHIP 0.1UH
L9	1-410-180-51	s	INDUCTOR CHIP 0.1UH
L10	1-410-180-51	s	INDUCTOR CHIP 0.1UH
L11	1-410-180-51	s	INDUCTOR CHIP 0.1UH
L12	1-410-180-51	s	INDUCTOR CHIP 0.1UH
L13	1-412-026-11	s	INDUCTOR CHIP 1uH
L14	1-412-026-11	s	INDUCTOR CHIP 1uH
R2	1-216-022-00	s	METAL, CHIP 75 5% 1/10W
RV1	1-230-523-11	s	RES, ADJ, METAL 10K
RV2	1-230-523-11	s	RES, ADJ, METAL 10K
SW1	1-570-857-11	s	SWITCH, SLIDE

EN-96/96P BOARD

Ref. No. or Q'ty	Part No.	SP	Description
1pc	A-7515-247-A	o	MOUNTED CIRCUIT BOARD, EN-96 (DXC-151)
1pc	A-7515-253-A	o	MOUNTED CIRCUIT BOARD, EN-96P (DXC-151P)
4pcs	1-568-351-11	o	CONNECTOR, BOARD TO BOARD 10P
C1	1-135-157-21	s	TANTAL 10uF 10% 6.3V (DXC-151P)
C3	1-163-009-11	s	CERAMIC, CHIP 0.001uF 10% 50V (DXC-151P)
C5	1-135-157-21	s	TANTAL 10uF 10% 6.3V (DXC-151P)
C6	1-135-157-21	s	TANTAL 10uF 10% 6.3V (DXC-151P)
C10	1-163-227-11	s	CERAMIC 10PF 5% 50V
C20	1-163-241-11	s	CERAMIC, CHIP 39PF 5% 50V
C21	1-164-005-11	s	CERAMIC, CHIP 0.47uF 25V
C22	1-163-227-11	s	CERAMIC 10PF 5% 50V
C23	1-163-009-11	s	CERAMIC, CHIP 0.001uF 10% 50V
C27	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C29	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C30	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C33	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C35	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C36	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C37	1-163-235-11	s	CERAMIC 22PF 5% 50V
C39	1-163-241-11	s	CERAMIC, CHIP 39PF 5% 50V
C41	1-163-251-11	s	CERAMIC 100PF 5% 50V
C45	1-163-235-11	s	CERAMIC 22PF 5% 50V
C46	1-163-241-11	s	CERAMIC, CHIP 39PF 5% 50V
C49	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C51	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C52	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C53	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C56	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C57	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C58	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C59	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C61	1-163-227-11	s	CERAMIC 10PF 5% 50V
C64	1-163-241-11	s	CERAMIC, CHIP 39PF 5% 50V
C65	1-163-227-11	s	CERAMIC 10PF 5% 50V
C66	1-164-005-11	s	CERAMIC, CHIP 0.47uF 25V
C68	1-163-009-11	s	CERAMIC, CHIP 0.001uF 10% 50V
C69	1-163-009-11	s	CERAMIC, CHIP 0.001uF 10% 50V
C70	1-163-227-11	s	CERAMIC 10PF 5% 50V (DXC-151)
C72	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C76	1-135-162-21	s	TANTAL 33uF 10% 6.3V
C78	1-135-162-21	s	TANTAL 33uF 10% 6.3V
C79	1-163-235-11	s	CERAMIC 22PF 5% 50V
C80	1-163-235-11	s	CERAMIC 22PF 5% 50V
C81	1-163-100-00	s	CERAMIC, CHIP 20PF 5% 50V
DL1	1-415-635-21	s	DL (LC)
DL2	1-415-498-21	s	Y DL
FL1	1-236-368-11	s	LPF (YH)
FL2	1-415-634-21	s	DL (LC)

Please see page D-6 for the part number of capacitors and resistors that are not listed in the parts list.

(EN-96/96P BOARD)

Ref. No. or Q'ty	Part No.	SP	Description
IC1	8-759-011-65	s	IC MC74HC4053F
IC2	8-752-332-67	s	IC CXD1217M
IC3	8-752-033-34	s	IC CXA1072R
IC4	8-759-031-84	s	IC SC7S04F
IC6	1-577-044-11	s	OSCILLATOR, CRYSTAL (DXC-151P)
IC8	8-759-106-02	s	IC UPC4570G2
L1	1-412-031-11	s	INDUCTOR CHIP 47uH (DXC-151P)
L2	1-412-026-11	s	INDUCTOR CHIP 1uH
L3	1-412-026-11	s	INDUCTOR CHIP 1uH
L4	1-412-031-11	s	INDUCTOR CHIP 47uH
L5	1-410-717-31	s	INDUCTOR, CHIP 100uH (DXC-151)
L5	1-410-716-31	s	INDUCTOR, CHIP 82uH (DXC-151P)
Q1	8-729-109-44	s	TRANSISTOR 2SK94 (DXC-151P)
Q2	8-729-402-84	s	TRANSISTOR XN4601
Q3	8-729-402-84	s	TRANSISTOR XN4601
Q4	8-729-402-84	s	TRANSISTOR XN4601
Q5	8-729-402-84	s	TRANSISTOR XN4601
Q6	8-729-402-81	s	TRANSISTOR XN4501
Q7	8-729-402-84	s	TRANSISTOR XN4601
Q9	8-729-271-22	s	TRANSISTOR 2SC2712-G
Q10	8-729-271-22	s	TRANSISTOR 2SC2712-G
RV1	1-238-090-11	s	RES, ADJ METAL 10K
RV2	1-238-092-11	s	RES, ADJ, METAL 47K
RV3	1-238-092-11	s	RES, ADJ, METAL 47K
RV4	1-238-092-11	s	RES, ADJ, METAL 47K
RV5	1-238-092-11	s	RES, ADJ, METAL 47K
RV6	1-238-092-11	s	RES, ADJ, METAL 47K (DXC-151P)
RV7	1-238-091-11	s	RES, ADJ, METAL 22K
RV8	1-238-092-11	s	RES, ADJ, METAL 47K
RV9	1-238-092-11	s	RES, ADJ, METAL 47K
RV10	1-238-087-11	s	RES, ADJ, METAL 1K
RV11	1-238-087-11	s	RES, ADJ, METAL 1K
SW1	1-571-277-11	s	SWITCH, SLIDE

Please see page D-6 for the part number of capacitors and resistors that are not listed in the parts list.

MB-320 BOARD

Ref. No. or Q'ty	Part No.	SP	Description
1pc	A-7515-244-A	o	MOUNTED CIRCUIT BOARD, MB-320
23pcs	1-568-328-11	o	CONNECTOR, BOARD TO BOARD 10P
1pc	1-590-357-11	o	CABLE, FLAT (1.0MM)
1pc	3-167-756-01	s	SHEET, INSULATING, DD
C3	1-135-154-21	s	TANTAL 3.3uF 20% 20V
C4	1-135-166-21	s	TANTALUM, CHIP 47uF 10% 10V
C5	1-135-166-21	s	TANTALUM, CHIP 47uF 10% 10V
C6	1-135-166-21	s	TANTALUM, CHIP 47uF 10% 10V
C7	1-135-079-21	s	TANTAL 3.3uF 20% 25V
C8	1-135-159-21	s	TANTALUM, CHIP 10uF 10% 20V
C9	1-135-166-21	s	TANTALUM, CHIP 47uF 10% 10V
C10	1-135-166-21	s	TANTALUM, CHIP 47uF 10% 10V
C11	1-135-166-21	s	TANTALUM, CHIP 47uF 10% 10V
C12	1-135-166-21	s	TANTALUM, CHIP 47uF 10% 10V
C13	1-135-166-21	s	TANTALUM, CHIP 47uF 10% 10V
C14	1-135-166-21	s	TANTALUM, CHIP 47uF 10% 10V
C15	1-135-154-21	s	TANTAL 3.3uF 20% 20V
C17	1-126-923-11	s	ELECT 220uF 20% 10V
C18	1-135-154-21	s	TANTAL 3.3uF 20% 20V
C19	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C20	1-163-227-11	s	CERAMIC 10PF 5% 50V
C22	1-163-227-11	s	CERAMIC 10PF 5% 50V
C24	1-163-227-11	s	CERAMIC 10PF 5% 50V
C25	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C26	1-163-227-11	s	CERAMIC 10PF 5% 50V
C28	1-163-227-11	s	CERAMIC 10PF 5% 50V
C30	1-163-227-11	s	CERAMIC 10PF 5% 50V
C31	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C32	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C33	1-126-942-11	s	ELECT 1000uF 20% 25V
CN101	1-566-430-11	o	PIN, CONNECTOR 2P
CN102	1-580-716-11	o	PIN, CONNECTOR (PC BOARD) 13P
D1	8-719-200-36	s	DIODE E10QS04
D2	8-719-106-44	s	DIODE RD9.1M-B2
D3	8-719-800-76	s	DIODE 1SS226
D4	8-719-800-76	s	DIODE 1SS226
D5	8-719-800-76	s	DIODE 1SS226
D6	8-719-800-76	s	DIODE 1SS226
IC1	8-759-037-41	s	IC MC14577AF
IC2	8-759-037-41	s	IC MC14577AF
IC3	8-759-037-41	s	IC MC14577AF
IC4	8-759-037-41	s	IC MC14577AF
IC5	8-759-037-41	s	IC MC14577AF
IC6	8-759-037-41	s	IC MC14577AF
L1	1-412-026-11	s	INDUCTOR CHIP 1uH
L2	1-412-026-11	s	INDUCTOR CHIP 1uH
L4	1-412-031-11	s	INDUCTOR CHIP 47uH
L5	1-412-031-11	s	INDUCTOR CHIP 47uH
L6	1-412-031-11	s	INDUCTOR CHIP 47uH
L7	1-412-031-11	s	INDUCTOR CHIP 47uH
PU1	1-466-471-11	s	DC-DC CONVERTER
Q1	8-729-103-72	s	TRANSISTOR 2SD1005-BV

(MB-320 BOARD)

Ref. No. or Q'ty	Part No.	SP	Description
R21	1-216-022-00	s	METAL, CHIP 75 5% 1/10W
R22	1-216-022-00	s	METAL, CHIP 75 5% 1/10W
R23	1-216-022-00	s	METAL, CHIP 75 5% 1/10W
R24	1-216-022-00	s	METAL, CHIP 75 5% 1/10W
R25	1-216-022-00	s	METAL, CHIP 75 5% 1/10W
R26	1-216-022-00	s	METAL, CHIP 75 5% 1/10W

MX-28 BOARD

Ref. No. or Q'ty	Part No.	SP	Description
1pc	A-7515-245-A	o	MOUNTED CIRCUIT BOARD, MX-28
3pcs	1-568-351-11	o	CONNECTOR, BOARD TO BOARD 10P
C1	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C2	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C3	1-135-155-21	s	TANTAL CHIP 4.7uF 10% 16V
C4	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C5	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C6	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C7	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C8	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C10	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C11	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C12	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C13	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C14	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C16	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C17	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C20	1-163-235-11	s	CERAMIC 22PF 5% 50V
C21	1-163-235-11	s	CERAMIC 22PF 5% 50V
C22	1-163-235-11	s	CERAMIC 22PF 5% 50V
C23	1-135-161-21	s	TANTALUM, CHIP 22uF 10% 10V
C24	1-135-161-21	s	TANTALUM, CHIP 22uF 10% 10V
C25	1-135-155-21	s	TANTAL CHIP 4.7uF 10% 16V
C26	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C29	1-135-162-21	s	TANTAL 33uF 10% 6.3V
C31	1-135-162-21	s	TANTAL 33uF 10% 6.3V
C35	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C36	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C38	1-135-161-21	s	TANTALUM, CHIP 22uF 10% 10V
C39	1-135-161-21	s	TANTALUM, CHIP 22uF 10% 10V
C40	1-135-161-21	s	TANTALUM, CHIP 22uF 10% 10V
C41	1-135-161-21	s	TANTALUM, CHIP 22uF 10% 10V
C42	1-135-161-21	s	TANTALUM, CHIP 22uF 10% 10V
C44	1-135-155-21	s	TANTAL CHIP 4.7uF 10% 16V
C47	1-163-241-11	s	CERAMIC, CHIP 39PF 5% 50V
C50	1-163-241-11	s	CERAMIC, CHIP 39PF 5% 50V
C52	1-135-155-21	s	TANTAL CHIP 4.7uF 10% 16V
C53	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C57	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C72	1-135-161-21	s	TANTALUM, CHIP 22uF 10% 10V
C73	1-135-161-21	s	TANTALUM, CHIP 22uF 10% 10V
C74	1-135-161-21	s	TANTALUM, CHIP 22uF 10% 10V
C75	1-135-161-21	s	TANTALUM, CHIP 22uF 10% 10V
D1	8-719-800-76	s	DIODE 1SS226
D2	8-719-400-18	s	DIODE MA152WK
IC1	8-752-329-60	s	IC CXL1505M
IC2	8-752-329-60	s	IC CXL1505M
IC3	8-759-106-02	s	IC UPC4570G2
IC4	8-759-106-02	s	IC UPC4570G2
IC5	8-752-015-08	s	IC CX20151
IC6	8-759-100-94	s	IC UPC358G2
L1	1-412-026-11	s	INDUCTOR CHIP 1uH
L2	1-412-026-11	s	INDUCTOR CHIP 1uH
L3	1-412-026-11	s	INDUCTOR CHIP 1uH

Please see page D-6 for the part number of capacitors and resistors that are not listed in the parts list.

(MX-28 BOARD)

Ref. No. or Q'ty	Part No.	SP	Description
Q1	8-729-271-22	s	TRANSISTOR 2SC2712-G
Q2	8-729-271-22	s	TRANSISTOR 2SC2712-G
Q3	8-729-271-22	s	TRANSISTOR 2SC2712-G
Q4	8-729-402-84	s	TRANSISTOR XN4601
Q5	8-729-402-84	s	TRANSISTOR XN4601
Q6	8-729-271-22	s	TRANSISTOR 2SC2712-G
Q7	8-729-271-22	s	TRANSISTOR 2SC2712-G
Q8	8-729-403-27	s	TRANSISTOR XN4401
Q9	8-729-403-27	s	TRANSISTOR XN4401
Q12	8-729-403-27	s	TRANSISTOR XN4401
Q13	8-729-403-27	s	TRANSISTOR XN4401
Q14	8-729-403-27	s	TRANSISTOR XN4401
Q15	8-729-403-27	s	TRANSISTOR XN4401
Q16	8-729-271-22	s	TRANSISTOR 2SC2712-G
R4	1-216-056-00	s	METAL, CHIP 2K 5% 1/10W
R5	1-216-056-00	s	METAL, CHIP 2K 5% 1/10W
R9	1-216-056-00	s	METAL, CHIP 2K 5% 1/10W
R58	1-216-056-00	s	METAL, CHIP 2K 5% 1/10W
RV2	1-238-090-11	s	RES, ADJ, METAL 10K
RV3	1-238-090-11	s	RES, ADJ, METAL 10K
RV4	1-238-090-11	s	RES, ADJ, METAL 10K
RV5	1-238-090-11	s	RES, ADJ, METAL 10K
RV6	1-238-090-11	s	RES, ADJ, METAL 10K
RV7	1-238-090-11	s	RES, ADJ, METAL 10K
RV8	1-238-090-11	s	RES, ADJ, METAL 10K
RV9	1-238-090-11	s	RES, ADJ, METAL 10K
RV10	1-238-090-11	s	RES, ADJ, METAL 10K

Please see page D-6 for the part number of capacitors and resistors that are not listed in the parts list.

PR-146 BOARD

Ref. No. or Q'ty	Part No.	SP	Description
1pc	A-7515-249-A	o	MOUNTED CIRCUIT BOARD, PR-146
4pcs	1-568-351-11	o	CONNECTOR, BOARD TO BOARD 10P
C1	1-135-162-21	s	TANTAL 33uF 10% 6.3V
C2	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C3	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C4	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C5	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C6	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C7	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C8	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C9	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C10	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C12	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C13	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C14	1-135-162-21	s	TANTAL 33uF 10% 6.3V
C17	1-135-162-21	s	TANTAL 33uF 10% 6.3V
C18	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C19	1-135-155-21	s	TANTAL CHIP 4.7uF 10% 16V
C20	1-135-161-21	s	TANTALUM, CHIP 22uF 10% 10V
C23	1-135-161-21	s	TANTALUM, CHIP 22uF 10% 10V
C27	1-135-162-21	s	TANTAL 33uF 10% 6.3V
C34	1-135-155-21	s	TANTAL CHIP 4.7uF 10% 16V
C35	1-135-155-21	s	TANTAL CHIP 4.7uF 10% 16V
C36	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C37	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C38	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C39	1-135-149-21	s	TANTALUM, CHIP 2.2uF 10% 10V
C40	1-135-149-21	s	TANTALUM, CHIP 2.2uF 10% 10V
C41	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C42	1-163-088-00	s	CERAMIC, CHIP 5PF 50V
C43	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C44	1-135-155-21	s	TANTAL CHIP 4.7uF 10% 16V
C45	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C46	1-164-222-11	s	CERAMIC 0.22uF 25V
C49	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C50	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C53	1-135-162-21	s	TANTAL 33uF 10% 6.3V
C55	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C56	1-135-149-21	s	TANTALUM, CHIP 2.2uF 10% 10V
C58	1-163-088-00	s	CERAMIC, CHIP 5PF 50V
C59	1-163-227-11	s	CERAMIC 10PF 5% 50V
C60	1-163-227-11	s	CERAMIC 10PF 5% 50V
D1	8-719-400-18	s	DIODE MA152WK
D2	8-719-400-18	s	DIODE MA152WK
FL1	1-236-368-11	s	LPF (YH)
FL2	1-236-368-11	s	LPF (YH)
IC1	8-759-011-64	s	IC MC74HC4052F
IC2	8-752-032-48	s	IC CXA1157M
IC3	8-759-933-24	s	IC CX20053
IC4	8-752-034-23	s	IC CXA1337R
L1	1-412-026-11	s	INDUCTOR CHIP 1uH
L2	1-412-026-11	s	INDUCTOR CHIP 1uH
Q1	8-729-402-84	s	TRANSISTOR XN4601
Q2	8-729-421-23	s	TRANSISTOR XN1216

(PR-146 BOARD)

Ref. No. or Q'ty	Part No.	SP	Description
Q3	8-729-403-42	s	TRANSISTOR XN1401
Q4	8-729-271-22	s	TRANSISTOR 2SC2712-G
Q5	8-729-216-22	s	TRANSISTOR 2SA1162
Q6	8-729-900-53	s	TRANSISTOR DTC114EK
Q7	8-729-900-53	s	TRANSISTOR DTC114EK
Q8	8-729-900-53	s	TRANSISTOR DTC114EK
Q9	8-729-271-22	s	TRANSISTOR 2SC2712-G
Q10	8-729-402-84	s	TRANSISTOR XN4601
Q11	8-729-402-81	s	TRANSISTOR XN4501
Q12	8-729-402-81	s	TRANSISTOR XN4501
Q13	8-729-402-81	s	TRANSISTOR XN4501
Q14	8-729-900-53	s	TRANSISTOR DTC114EK
Q15	8-729-900-53	s	TRANSISTOR DTC114EK
Q16	8-729-402-84	s	TRANSISTOR XN4601
Q17	8-729-402-84	s	TRANSISTOR XN4601
RV1	1-238-088-11	s	RES, ADJ, METAL 2.2K
RV2	1-238-090-11	s	RES, ADJ, METAL 10K
RV3	1-238-090-11	s	RES, ADJ, METAL 10K
RV4	1-238-090-11	s	RES, ADJ, METAL 10K
RV5	1-238-088-11	s	RES, ADJ, METAL 2.2K
RV6	1-238-090-11	s	RES, ADJ, METAL 10K
RV7	1-238-090-11	s	RES, ADJ, METAL 10K
RV8	1-238-090-11	s	RES, ADJ, METAL 10K
RV9	1-238-090-11	s	RES, ADJ, METAL 10K
RV10	1-238-090-11	s	RES, ADJ, METAL 10K

RD-18 BOARD

Ref. No. or Q'ty	Part No.	SP	Description
1pc	A-7515-250-A	o	MOUNTED CIRCUIT BOARD, RD-18
3pcs	1-568-351-11	o	CONNECTOR, BOARD TO BOARD 10P
C1	1-135-149-21	s	TANTALUM, CHIP 2.2uF 10% 10V
C2	1-163-227-11	s	CERAMIC 10PF 5% 50V
C3	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C4	1-135-149-21	s	TANTALUM, CHIP 2.2uF 10% 10V
C5	1-163-227-11	s	CERAMIC 10PF 5% 50V
C6	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C9	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C11	1-163-227-11	s	CERAMIC 10PF 5% 50V
C13	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C14	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C16	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C17	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C18	1-135-149-21	s	TANTALUM, CHIP 2.2uF 10% 10V
C19	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C20	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C21	1-163-235-11	s	CERAMIC 22PF 5% 50V
C22	1-163-241-11	s	CERAMIC, CHIP 39PF 5% 50V
C25	1-164-222-11	s	CERAMIC 0.22uF 25V
C27	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C28	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C29	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C30	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C32	1-164-222-11	s	CERAMIC 0.22uF 25V
C34	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C35	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C36	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C37	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C39	1-164-222-11	s	CERAMIC 0.22uF 25V
C41	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C42	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C43	1-135-177-21	s	TANTALUM CHIP 1uF 10% 25V
C44	1-135-157-21	s	TANTAL 10uF 10% 6.3V
DL1	1-415-635-21	s	DL (LC)
IC3	8-752-033-34	s	IC CXA1072R
IC4	8-752-033-34	s	IC CXA1072R
IC5	8-752-033-34	s	IC CXA1072R
IC7	8-759-106-02	s	IC UPC4570G2
IC8	8-759-106-02	s	IC UPC4570G2
L1	1-412-026-11	s	INDUCTOR CHIP 1uH
L2	1-412-026-11	s	INDUCTOR CHIP 1uH
Q1	8-729-271-22	s	TRANSISTOR 2SC2712-G
Q2	8-729-402-84	s	TRANSISTOR XN4601
Q3	8-729-402-84	s	TRANSISTOR XN4601
Q4	8-729-402-84	s	TRANSISTOR XN4601
Q5	8-729-402-84	s	TRANSISTOR XN4601
Q6	8-729-402-84	s	TRANSISTOR XN4601
Q7	8-729-402-84	s	TRANSISTOR XN4601
RV1	1-238-092-11	s	RES, ADJ, METAL 47K
RV2	1-238-092-11	s	RES, ADJ, METAL 47K
RV3	1-238-092-11	s	RES, ADJ, METAL 47K
RV4	1-238-092-11	s	RES, ADJ, METAL 47K
RV5	1-238-092-11	s	RES, ADJ, METAL 47K

Please see page D-6 for the part number of capacitors and resistors that are not listed in the parts list.

(RD-18 BOARD)

Ref. No. or Q'ty	Part No.	SP	Description
RV6	1-238-092-11	s	RES, ADJ, METAL 47K
RV7	1-238-092-11	s	RES, ADJ, METAL 47K
RV8	1-238-092-11	s	RES, ADJ, METAL 47K
RV9	1-238-092-11	s	RES, ADJ, METAL 47K
RV10	1-238-092-11	s	RES, ADJ, METAL 47K
RV11	1-238-092-11	s	RES, ADJ, METAL 47K
RV12	1-238-092-11	s	RES, ADJ, METAL 47K
SW1	1-571-275-11	s	SWITCH, SLIDE
SW2	1-571-275-11	s	SWITCH, SLIDE

SG-177/177P BOARD

Ref. No. or Q'ty	Part No.	SP	Description
1pc	A-7515-251-A	o	MOUNTED CIRCUIT BOARD, SG-177 (DXC-151)
1pc	A-7515-254-A	o	MOUNTED CIRCUIT BOARD, SG-177P (DXC-151P)
2pcs	1-568-351-11	o	CONNECTOR, BOARD TO BOARD 10P
C1	1-126-933-11	s	ELECT 100uF 20% 16V
C3	1-163-100-00	s	CERAMIC, CHIP 20PF 5% 50V
C4	1-163-245-11	s	CERAMIC 56PF 5% 50V
C5	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C6	1-135-161-21	s	TANTALUM, CHIP 22uF 10% 10V
C9	1-135-161-21	s	TANTALUM, CHIP 22uF 10% 10V
C10	1-135-162-21	s	TANTAL 33uF 10% 6.3V
C13	1-135-162-21	s	TANTAL 33uF 10% 6.3V
C23	1-163-009-11	s	CERAMIC, CHIP 0.001uF 10% 50V (DXC-151P)
C24	1-163-009-11	s	CERAMIC, CHIP 0.001uF 10% 50V
IC1	1-807-836-11	s	HYBRID-IC (SYNC SEP)
IC2	8-741-134-00	s	IC BX-1340
IC3	1-808-514-11	s	IC IB-37
IC4	1-808-513-12	s	IC IB-38
IC5	8-759-907-81	s	IC SN74LS221NS
IC6	8-759-031-84	s	IC SC7S04F
L1	1-410-717-31	s	INDUCTOR, CHIP 100uH (DXC-151)
L1	1-410-716-31	s	INDUCTOR, CHIP 82uH (DXC-151P)
L2	1-410-712-31	s	INDUCTOR CHIP 39UH (DXC-151)
L2	1-410-711-31	s	INDUCTOR CHIP 33UH (DXC-151P)
L3	1-412-031-11	s	INDUCTOR CHIP 47uH
L4	1-412-031-11	s	INDUCTOR CHIP 47uH

SW-439/439P BOARD

Ref. No. or Q'ty	Part No.	SP	Description
1pc	1-637-476-11	o	PRINTED CIRCUIT BOARD, SW-439 (DXC-151)
1pc	1-637-476-11	o	PRINTED CIRCUIT BOARD, SW-439P (DXC-151P)
2pcs	1-533-146-00	o	HOLDER, FUSE
1pc	1-946-971-11	o	HARNESS (CN-SW)
1pc	1-946-972-11	o	HARNESS (SW-MB)
C3	1-163-009-11	s	CERAMIC, CHIP 0.001uF 10% 50V (DXC-151)
C4	1-163-009-11	s	CERAMIC, CHIP 0.001uF 10% 50V (DXC-151)
C5	1-163-009-11	s	CERAMIC, CHIP 0.001uF 10% 50V (DXC-151P)
C6	1-163-009-11	s	CERAMIC, CHIP 0.001uF 10% 50V (DXC-151P)
C7	1-163-009-11	s	CERAMIC, CHIP 0.001uF 10% 50V (DXC-151P)
C8	1-163-009-11	s	CERAMIC, CHIP 0.001uF 10% 50V (DXC-151P)
D1	8-719-800-33	s	DIODE TLG102A
F1	⚠ 1-532-741-11	s	FUSE, GLASS TUBE (DXC-151)
F1	⚠ 1-532-285-00	s	FUSE, TIME-LAG 1.25A 250V (DXC-151P)
SW1	1-553-856-00	s	SWITCH, TACTILE
SW2	1-571-881-11	s	SWITCH, ROTARY (DR-FC10P)
SW3	1-571-881-11	s	SWITCH, ROTARY (DR-FC10P)
SW4	1-571-881-11	s	SWITCH, ROTARY (DR-FC10P)

Please see page D-6 for the part number of capacitors and resistors that are not listed in the parts list.

TG-83/83P BOARD

Ref. No. or Q'ty	Part No.	SP	Description
1pc	A-7515-246-A	o	MOUNTED CIRCUIT BOARD, TG-83 (DXC-151)
1pc	A-7515-252-A	o	MOUNTED CIRCUIT BOARD, TG-83P (DXC-151P)
4pcs	1-568-351-11	o	CONNECTOR, BOARD TO BOARD 10P
C3	1-163-227-11	s	CERAMIC 10PF 5% 50V
C4	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C6	1-163-227-11	s	CERAMIC 10PF 5% 50V
C7	1-163-227-11	s	CERAMIC 10PF 5% 50V
C8	1-163-227-11	s	CERAMIC 10PF 5% 50V
C9	1-135-157-21	s	TANTAL 10uF 10% 6.3V
C10	1-135-154-21	s	TANTAL 3.3uF 20% 20V
C11	1-135-079-21	s	TANTAL 3.3uF 20% 25V
C12	1-135-154-21	s	TANTAL 3.3uF 20% 20V
C15	1-135-145-11	s	TANTALUM, CHIP 0.47uF 10% 35V
C16	1-135-145-11	s	TANTALUM, CHIP 0.47uF 10% 35V
C17	1-135-145-11	s	TANTALUM, CHIP 0.47uF 10% 35V
C18	1-135-145-11	s	TANTALUM, CHIP 0.47uF 10% 35V
C19	1-135-079-21	s	TANTAL 3.3uF 20% 25V
C20	1-135-079-21	s	TANTAL 3.3uF 20% 25V
C22	1-135-154-21	s	TANTAL 3.3uF 20% 20V
C23	1-135-154-21	s	TANTAL 3.3uF 20% 20V
C24	1-135-154-21	s	TANTAL 3.3uF 20% 20V
C25	1-135-154-21	s	TANTAL 3.3uF 20% 20V
C26	1-135-154-21	s	TANTAL 3.3uF 20% 20V
C27	1-135-154-21	s	TANTAL 3.3uF 20% 20V
C28	1-135-154-21	s	TANTAL 3.3uF 20% 20V
C29	1-135-154-21	s	TANTAL 3.3uF 20% 20V
C31	1-135-154-21	s	TANTAL 3.3uF 20% 20V
C33	1-135-079-21	s	TANTAL 3.3uF 20% 25V
C35	1-135-154-21	s	TANTAL 3.3uF 20% 20V
C38	1-163-227-11	s	CERAMIC 10PF 5% 50V
C39	1-163-227-11	s	CERAMIC 10PF 5% 50V
C44	1-163-251-11	s	CERAMIC 100PF 5% 50V
C45	1-135-154-21	s	TANTAL 3.3uF 20% 20V
C47	1-135-162-21	s	TANTAL 33uF 10% 6.3V
C49	1-135-162-21	s	TANTAL 33uF 10% 6.3V
C50	1-135-162-21	s	TANTAL 33uF 10% 6.3V
D1	8-719-104-34	s	DIODE 1S2836
D2	8-719-400-18	s	DIODE MA152WK
D3	8-719-400-18	s	DIODE MA152WK
D4	8-719-104-34	s	DIODE 1S2836
D5	8-719-104-34	s	DIODE 1S2836
D6	8-719-104-34	s	DIODE 1S2836
D7	8-719-400-18	s	DIODE MA152WK
D8	8-719-800-76	s	DIODE 1SS226
D9	8-719-104-34	s	DIODE 1S2836
D10	8-719-104-34	s	DIODE 1S2836
IC1	1-567-779-41	s	VIBRATOR, CRYSTAL (VCO) (DXC-151)
IC1	1-567-779-21	s	VIBRATOR, CRYSTAL (VCO) (DXC-151P)
IC2	8-752-031-03	s	IC CXA1065M
IC3	8-759-031-07	s	IC MC74HC27F
IC4	8-752-326-17	s	IC CXD1149R

(TG-83/83P BOARD)

Ref. No. or Q'ty	Part No.	SP	Description
IC5	8-752-329-33	s	IC CXD1251Q
IC7	8-759-032-14	s	IC MC74HC08AF
L1	1-412-031-11	s	INDUCTOR CHIP 47uH
L2	1-412-031-11	s	INDUCTOR CHIP 47uH
L3	1-412-031-11	s	INDUCTOR CHIP 47uH
L4	1-412-031-11	s	INDUCTOR CHIP 47uH
Q3	8-729-402-84	s	TRANSISTOR XN4601
Q4	8-729-104-25	s	TRANSISTOR 2SB804-AV
Q5	8-729-103-72	s	TRANSISTOR 2SD1005-BV
Q6	8-729-271-22	s	TRANSISTOR 2SC2712-G
Q7	8-729-421-23	s	TRANSISTOR XN1216
Q8	8-729-402-84	s	TRANSISTOR XN4601
Q9	8-729-271-22	s	TRANSISTOR 2SC2712-G
Q10	8-729-216-22	s	TRANSISTOR 2SA1162
R32	1-216-084-00	s	METAL 30K 5% 1/10W
RV1	1-238-092-11	s	RES, ADJ, METAL 47K

Please see page D-6 for the part number of capacitors and resistors that are not listed in the parts list.

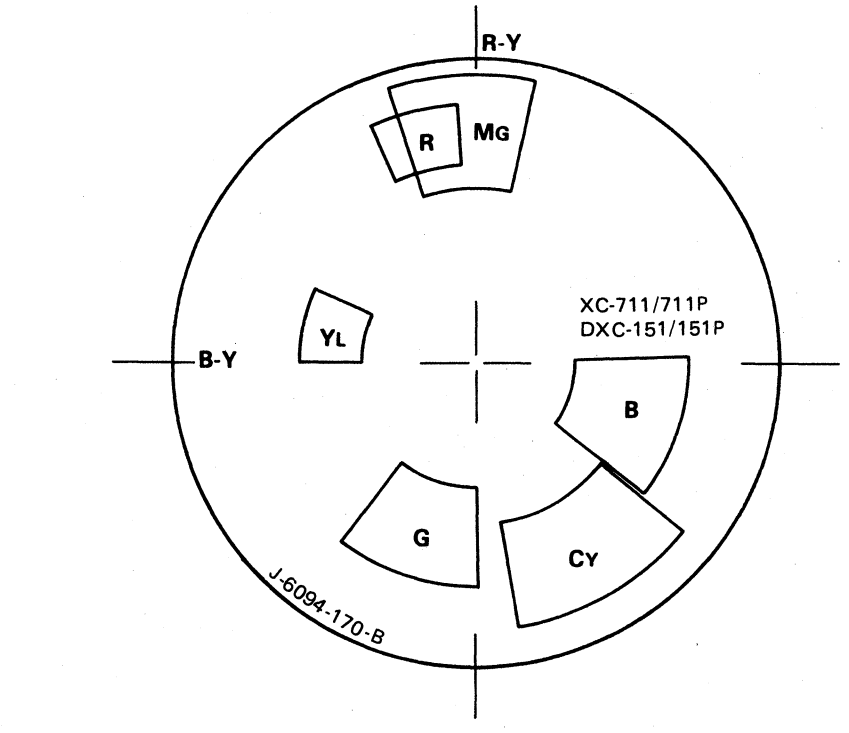
FRAME

Ref. No. or Q'ty	Part No.	SP	Description
CN101	1-562-381-00	s	CONNECTOR, ROUND TYPE 12P, MALE "DC IN"
CN102	1-580-724-11	s	CONNECTOR, BNC "GENLOCK IN"
CN103	1-580-724-11	s	CONNECTOR, BNC "VIDEO OUT"
CN104	1-580-172-11	s	CONNECTOR, MICRO 4P, FEMALE "LENS"
CN105	1-580-090-11	s	D-SUB CONNECTOR 9P, FEMALE "RGB/SYNC"

FIXTURE

Part No.	SP	Description
J-6094-170-B	s	VECTORSCOPE SCALE
J-6095-730-A	s	EXTENSION BOARD 40P

Please see page D-6 for the part number of capacitors and resistors that are not listed in the parts list.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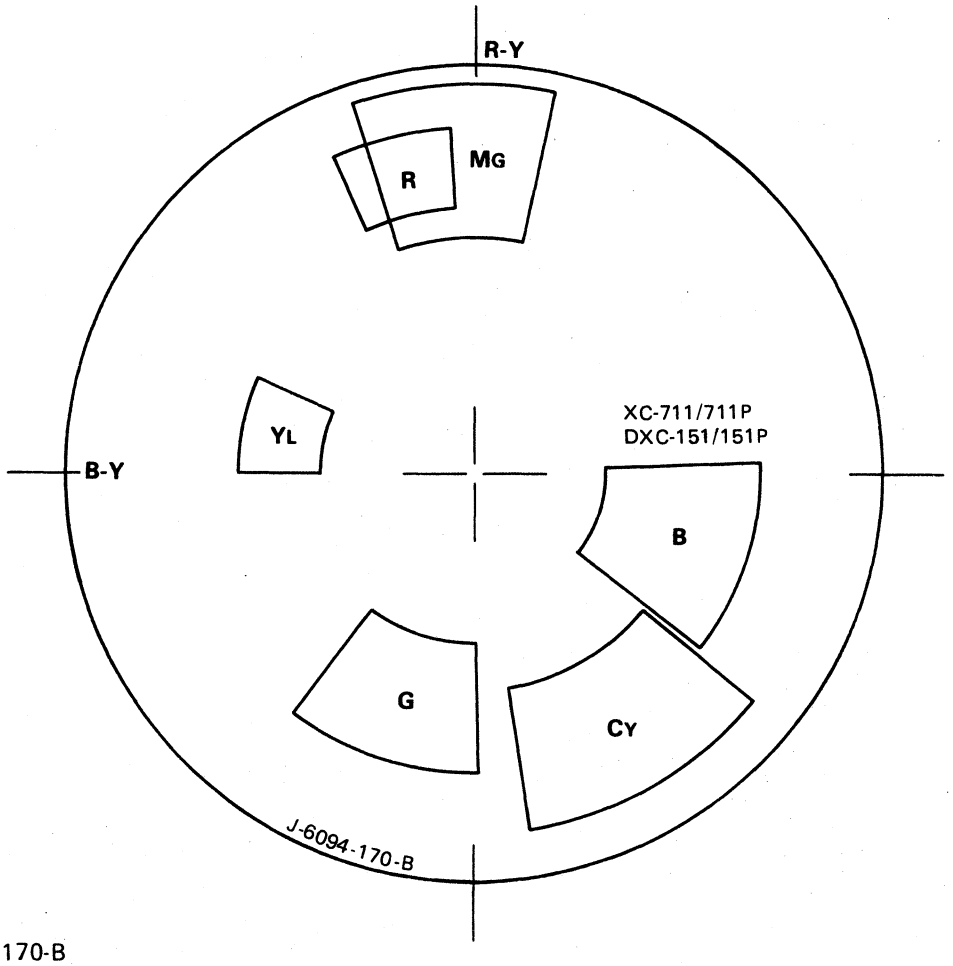
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J-6094-170-B